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FRENCH LIMITED SITE
CROSBY, TEXAS

**DNAPL INVESTIGATION
PRELIMINARY REPORT**

Submitted to:

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Submitted by:

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July 1992

01502432

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1.0 INTRODUCTION

This report describes the detailed results of an initial investigation conducted in the S1-16 and INT-11 well areas in April 1992 to delineate the extent of free-phase organic liquid. Major results of this investigation were first presented in the April 1992 Monthly Progress Report.

1.1 Background

The geology of the French Limited site is divided into three zones¹: the lower silty sand zone, the middle clayey zone, and the upper alluvial zone. The lower silty sand zone is a confined aquifer, the top of which is between 109 and 137 feet below ground surface (BGS). It is separated from the upper alluvial zone by the middle clayey zone, a 60- to 90-foot-thick aquitard, referred to as the C2 clay. The upper alluvial zone is up to 55 feet thick. It is subdivided into a lower water-bearing zone of interbedded sands, silts, and clays (the INT unit), an upper sandy water-bearing zone (the S1 unit), and a clay aquitard (the C1 unit) that separates the INT and S1 units. Contaminated groundwater at the site is limited to the S1 and INT units, and is being remediated by a combination of source cleanup (lagoon bioremediation), physical and hydraulic source migration controls (a sheet-pile migration control wall and an inward-gradient groundwater extraction system), groundwater extraction and surface treatment using a fixed-film bioreactor, and in-situ bioremediation using a system of injection wells.

Dense non-aqueous phase liquids (DNAPLs) were first detected at the S1-16 and INT-11 production wells in January, 1992, shortly after initiation of the production well system in early January 1992. Well S1-16 is located inside the floodwall at the southeast end of the lagoon; well INT-11 is located outside the floodwall, east of center of the south side of the lagoon (see Figure 1).

A sample of DNAPL was collected from well S1-16 in January 1992 and analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), total organic carbon (TOC), total petroleum hydrocarbons (TPH), and total chlorinated hydrocarbons (TOX). The results of these analyses are presented in Appendix 1. The sample contained very high concentrations of VOCs including chloroform (7.8%), 1,2-DCA (6.5%), carbon tetrachloride (2%), 1,1-DCA (0.2%), 1,2-DCE (0.2%), and TCE (0.1%), and tentatively identified compounds (TICs) including bromochloromethane (2.5%) and 1,4-difluorobenzene (2.3%). Therefore, total VOCs exceeded 20%. The sample also contained high concentrations of SVOCs including naphthalene (0.5%).

A sample of DNAPL was collected from well INT-11 in March 1992 and analyzed for VOCs, TOC and TOX. The results of these analyses are presented in Appendix 2. The sample contained high concentrations of VOCs including chloroform (810,000 ppb), 1,2-DCA (650,000 ppb), vinyl acetate (150,000 ppb), 4-methyl-2-pentanone (27,000 ppb), 2-butanone (23,000 ppb), trans-1,2-DCE (21,000 ppb), and other VOCs detected at 20,000 ppb or less. Total VOCs detected totaled 0.18%.

The April 1992 investigation was intended to follow up these indications of DNAPLs, and was conducted in two areas: around well S1-16, and around well INT-11. The aim of the investigation was to define the extent of free DNAPL outside the floodwall. The two areas investigated are shown on Figure 1.

¹ For more details, see *Hydrogeologic Assessment Report*, March, 1989, Chapters 2 and 3

1.2 Conceptual model of DNAPL migration

There are two mechanisms that may account for the presence of DNAPLs in borings near the French Lagoon:

- 1) Migration as a separate phase directly from the lagoon; and/or
- 2) Mobilization of organic constituents near the lagoon due to their increased solubility in the presence of organic solvents, followed by deposition further away from the lagoon due to decreasing solvent concentrations and lower solubility².

Because DNAPLs are denser than groundwater, and can be retained by aquifer matrix material, DNAPL migration below the water table at the French Limited site is principally controlled by the following factors³:

- 1) Residual saturation of aquifer matrix, i.e., the amount of DNAPL that is retained ("residual DNAPL");
- 2) Direction and hydraulic gradient of groundwater flow, causing unretained ("free") DNAPL to migrate downgradient;
- 3) Slope of the base surface of aquifer units, causing free DNAPL that has sunk to the base of the aquifer to migrate down-dip under gravity; and
- 4) Construction of the sheet-pile flood and migration control wall ("floodwall") in 1989, which, together with inward-gradient pumping from production wells inside the floodwall, should prevent any further migration of groundwater and DNAPL beyond the floodwall.

At the site, the present extent of free and residual DNAPL outside the floodwall likely reflects conditions existing before lagoon remediation and floodwall construction. The extent of free DNAPL within the floodwall probably has been modified by floodwall construction and inward-gradient pumping from wells within the floodwall. DNAPL present beneath the French lagoon has likely migrated downward to the top of the low permeability zone within and at the base of the S1 and INT units, down the dip slope of these low-permeability zones, and, where influenced by stronger hydraulic gradients near production wells, toward the wells pumping from inside the floodwall. However, the floodwall barrier is likely to prevent wells pumping inside the floodwall drawing free DNAPL back from outside the floodwall.

The main geological features of the site likely to affect DNAPL migration are the C1 and C2 clay units that divide and underlie the upper alluvial zone, respectively. The C1 unit separates the overlying S1 sandy unit from the underlying INT interbedded unit. The C2 unit is a thick clay that underlies the INT unit. The two clay units are probable effective barriers to DNAPL migration. However, as described below, the C1 unit thickness varies across the site and it is absent under part of the site. Subordinate geological features likely to retard downward DNAPL migration are minor clay layers within the S1 and INT units.

² This mechanism is described in more detail in *Hydrogeologic Characterization Report*, March 1989, Section 4.1 1.1 Note that, under this mechanism, because high-VOC water from the lagoon is denser than ambient groundwater, it would migrate under density difference in a similar manner to DNAPL.

³ Discussed further in Schwille, F., 1988, *Dense Chlorinated Solvents in Porous and Fractured Media, Model Experiments*, Lewis Publishers, 146 pp See pp 5-8 and figure IV b for a description of the effects of density, matrix retention, and sloping aquifer base

2.0 APRIL 1992 INVESTIGATION

The DNAPL investigation in the S1-16 and INT-11 areas was conducted using a cone-penetrometer test (CPT) rig. The rig was used to perform standard CPT soundings which provide detailed vertical engineering and lithologic profiles. This equipment measures the resistance of geologic materials to the penetration of a cone tool as it is pushed into the ground hydraulically. Both the tip resistance and the sleeve or friction resistance to penetration are recorded at intervals of 0.2 feet. Lithologies are defined by the tip and friction resistances and the ratio of these values. Sand units tend to have relatively high tip resistance but low friction resistance compared to clay units. Generally, a friction to tip resistance ratio of greater than 3% indicates clay soils.

A conductivity tool was also run in conjunction with the standard cone-penetrometer tool. The conductivity tool measures the electrical conductance (EC) of the geologic unit, which is a function of both the intergranular fluid and the soil matrix. DNAPLs have very low EC relative to groundwater, particularly high-TDS groundwater. Hence, zones containing a high content of DNAPL in the pore spaces would have a correspondingly lower overall EC than the same soil containing more conductive groundwater. However, if the soil pores contain a mixture of DNAPL and high-TDS groundwater, this effect could be masked. As described in Section 1.2, it is likely that DNAPL and denser groundwater would follow similar migration paths. Another potentially complicating factor is that sandy soils have a lower EC relative to clay soils. Both types of soil are typical of the site geology. These variations in soil type result in "background" variations in EC that must be considered in interpreting CPT-EC profiles.

After running the combination logs, the resistance, ratio, and conductivity profiles were interpreted to determine the depth zones at which DNAPL occurrence was most likely. The CPT rig was then used in soil sampling mode. In this mode, the rig is used to collect narrow-diameter split-spoon soil samples from the selected depth zones, in the same area as the CPT-EC soundings. The soil samples collected are about 1 inch in diameter and 1.5 feet in length. All CPT and soil sampling holes were cemented immediately after completion using cement grout tremied to the bottom of the hole.

During the April 1992 fieldwork, all CPT and soil sampling locations were surveyed for location coordinates and ground surface elevation. Borings and CPTs from earlier investigations at the site were incorporated into the evaluation of the S1-16 and INT-11 areas.

2.1 S1-16 Area

The locations of CPT soundings and soil samples in the S1-16 area are shown on Figure 2. CPT logs are presented in Appendix 3. Interpreted geologic cross sections A-A' and B-B' through the S1-16 area are shown in Figure 3. Both cross sections show the S1 sand unit, underlain by several feet of C1 clay. The relatively thick C1 Clay underlying this area is a probable competent low-permeability barrier to downward DNAPL migration.

Cross sections A-A' and B-B' show the CPT ratio percent profiles arranged in southwest to northeast transects across the investigation area, adjusted to sea level datum. Where available, conductivity curves are superimposed on ratio percent profiles. The ratio percent profiles indicate a thick, fairly uniform sand layer in the S1 interval. Descriptions of samples collected from this interval typically report a fining-upward sequence of coarse, occasionally gravelly sands at the base of the S1, grading to fine to medium sands at the top of the S1. The unit thickens from west to east across the S1-16 area.

Conductivity measurements in the S1 generally increase from top to bottom at individual CPT locations, and also from northeast to southwest in the S1 interval along both cross section traverses. Because the ratio percent profile does not indicate clay layering within the S1, the higher conductivities are likely indicative of higher TDS pore waters. Therefore, the EC pattern probably reflects the presence of high-TDS waters in the S1 unit to the south of French Lagoon and the migration of these denser fluids downward and along the base of the S1 sand.

From the interpreted CPT logs, the elevation of the top of the C1 clay (base of the S1 sand) was determined. Figure 4 shows the structure contours of this surface in the S1-16 area. The structure map was constructed based on CPT soundings performed during the April 1992 fieldwork, and CPT soundings performed during earlier investigations at the site. The top of the C1 generally dips to the east and southeast across the investigation area, away from the French Lagoon source. The elevation of the surface varies from estimated highs of -10.3 feet at C-11 and -11.8 feet at S1-16A to a low of -18.6 at S1-16D (exact elevations of the C1 surface are not available at some locations because the ground surface was not surveyed at the time of the earlier [pre-April 1992] CPT sounding, or was subsequently altered due to addition of fill, etc.). The dip of the C1 surface is approximately 0.13 ft/ft.

The C1 Clay isopach contour map (Figure 5) shows the thickness of the C1 unit beneath the S1-16 area. Figure 5 shows that the C1 clay generally exceeds 3 feet in thickness in this area, and thickens to the east and north. The C1 also thickens to the south outside the area of investigation. No data is available on the C1 thickness under French Lagoon.

Figure 6 summarizes data obtained regarding DNAPL occurrence in the S1 interval in the S1-16 area. This figure includes data obtained before and during the April 1992 investigation. These include analyses of soil samples collected from S1-17 (included in Table 1), and field observations of oily stains, residues, odors, etc. made during drilling (observations at S1-16A, S1-16C, S1-16G, and S1-16H are included in Table 2). Also shown in Figure 6 are organic vapor meter (OVM) readings made during drilling, and sites where conductivity anomalies (zones of relatively lower EC) were noted.

Inside the flood wall, CPT-EC sounding S1-16A was conducted near well S1-16 where DNAPL was detected. A conductivity anomaly close to the base of the S1 unit can be seen in Figure 3. Fluid samples retrieved from this interval using a small bailer lowered through the cone rods did not contain any DNAPL. However, during cementing of the CPT hole, a black oily mixture was observed in the cement returns, indicating that DNAPL had been present in the hole. Due to the high viscosity of DNAPL, it is difficult to retrieve by bailing. A second CPT-EC sounding conducted inside the floodwall at location S1-16B, east of the lagoon, did not indicate a low-conductivity zone, and no discoloration of the cement was noted during grouting.

Outside the floodwall, cone-penetrometer profiles were conducted at approximately 25 ft spacing in the vicinity of well S1-16. EC anomalies were noted at S1-16D and S1-16E. Because the top of the C1 unit slopes to the southeast, a number of split-spoon samples were attempted in the area outside the floodwall and southeast of S1-16. Unfortunately, attempts to retrieve soil samples at the S1/C1 interface were largely unsuccessful. The sampler apparently could not retain the fairly coarse-grained material typical of the base of the S1 unit. The only successful soil retrievals were at locations S1-16G and S1-16H. The soil samples appeared to contain residual DNAPL at the bottom of the S1.

Mainly because the sampling of the lower S1 material was not successful, further work is required in this area to clearly define the extent of DNAPL occurrence. Outside the floodwall the extent of DNAPL is defined to the northeast at S1-16H, and to the southwest at S1-16F. However, it is not defined to the southeast. The northwestern extent of this DNAPL is not defined but is likely the lagoon source.

2.2 INT-11 Area

The locations of CPT-EC soundings and soil samples in the INT-11 area are shown on Figure 7. CPT logs are presented in Appendix 4. An interpreted east-west geologic cross section through the INT-11 area, section C-C', prepared in the same way as sections A-A' and B-B', is shown in Figure 8. It shows the S1 sand unit overlying the INT interval, separated from it by a variable thickness of C1 clay. The C1 clay thickness decreases from 6 feet at INT-64 to 1 foot or less at INT-10, S1-11, and INT-63, and continues to thin to the west. The C1 clay isopach contour map (Figure 9) shows the thickness of the C1 unit beneath the INT-11 area. Figure 9 shows that the C1 clay is thin (< 1 foot) to the north and west of

the INT-11 area, and is absent west of INT-10. The thinning in the C1 clay appears to be due to erosion and downcutting during deposition of the S1 sand. Clearly, where the C1 clay is thin or absent it is unlikely to act as a barrier to downward DNAPL migration.

It is also possible that abandoned well REI-6-2 (see Figure 12 for location) could have acted as an additional vertical conduit for DNAPL. The construction details of REI-6-2 are presented in Appendix 5 and are shown projected onto section C-C' in Figure 8. The projected top of the water intake interval (comprising the screen and filter pack) is close to the top of the C1 clay. Although the boring log indicates 4 feet of clay at this location, adjacent CPT soundings show a much thinner clay. Therefore, it is possible that the water intake interval could connect the S1 and INT units. Because it is no longer in use, this well should be properly plugged and abandoned during future drilling work at the site.

From the interpreted CPT logs, the elevation of the top of the C1 clay (base of the S1 sand) was determined. Figure 10 shows the structure contours of this surface in the INT-11 area. The top of the C1 clay forms a low area under and south of the French Lagoon in the north central portion of the INT-11 area. This low corresponds with the area of thinning in the C1 clay described above, which is consistent with the removal of the C1 clay being due to erosion and downcutting during deposition of the S1 sand. Therefore, the top of the C1 generally dips inward toward the S1-11 and INT-11 locations, which would tend to cause DNAPL, if present, to accumulate near S1-11 and INT-11, in the area where the C1 clay is thin. The elevation of the surface varies from estimated highs of -10.8 feet at INT-64, and -13 feet between INT-10 and S1-23, to lows of -17.6 at INT-11 and -18.6 at S1-11 (exact elevations of the C1 surface are not available at some locations because the ground surface was not surveyed at the time of the earlier [pre-April 1992] CPT sounding, or was subsequently altered due to addition of fill, etc.) The inward dip of the C1 surface is approximately 0.11 ft/ft.

Where the C1 clay is thin or absent, and therefore unlikely to act as a barrier to downward migration, DNAPLs would tend to migrate downward to the top of the C2 clay (Beaumont Formation). The elevation of the top of the C2 clay (base of the INT interval) is shown on Figure 11. Figure 11 shows that the C2 clay in this area mainly dips to the east-northeast, from an estimated high of -31.5 feet at INT-63 to a low of -36.1 feet in INT-64. This is the main direction toward which DNAPL reaching the top of the C2 in this area would be expected to migrate. The dip of the C2 surface is approximately 0.04 ft/ft. To the west of the INT-11 area, the C2 surface dips at a similar gradient to the west-southwest from a ridge between C-3 and INT-63.

Figure 12 summarizes data obtained regarding DNAPL occurrence in the INT-11 area. This figure includes data obtained before and during the April 1992 investigation. These include TOC and TPH analyses of soil samples collected from INT-10 and INT-64 (included in Table 1), and field observations of oily stains, residues, odors, etc. made during CPT soil sampling (observations at INT-11A through INT-11G are included in Table 2). VOC analyses of soil samples collected from INT-64 are presented in Table 3. Analyses of soil samples collected at INT-11B and INT-11C are included in Appendix 6 and summarized in Table 4. Also shown in Figure 12 are organic vapor meter (OVM) readings made during drilling, and sites where conductivity anomalies (zones of relatively lower EC) were noted.

A CPT-EC sounding (INT-11A) was conducted near the INT-11 well where DNAPL is known to exist. A conductivity anomaly close to the base of the INT unit at INT-11A can be seen in Figure 8. The conductivity profile indicates a zone of relatively lower conductivity close to the base of the INT unit just above the underlying C2 Clay. Fluid samples retrieved through the cone rods using a small bailer from this interval did not show any DNAPL. As indicated above, it is difficult to retrieve the higher viscosity free-phase fluids by this method. However, during cementing of the CPT hole, a black oily mixture was observed in the cement returns indicating the presence of DNAPL in this hole. Field observations made during CPT soil sampling also suggested possible free DNAPL at INT-11B through F. Soil samples obtained from the 48 to 49 ft depth interval at these locations showed evidence of DNAPL residual. The soil samples left an oily residue on the core barrel and when squeezed the soils released a watery oily fluid. However, free DNAPL in the pore spaces of these soil samples was not evident.

Field observations made during drilling indicated residual DNAPL at INT-10. However, soil samples collected from INT-10 did not contain detectable TOC. VOC analyses were not performed on these samples. INT-10 may represent an area of residual DNAPL. Soil samples collected from INT-64 did not contain detectable TPH and did not show staining or free DNAPL. However, soil samples collected from INT-64 (Table 3) showed high concentrations of VOCs, particularly in the lower 10 feet, i.e., above the C2 clay. VOCs detected include methylene chloride, (5.1 ppm), 1,2-dichloroethane (4.4 ppm), acetone (3.4 ppm), carbon disulfide (2.8 ppm), and chloroform (1 ppm). These high concentrations of VOCs and their distribution with depth suggest that INT-64 may be at the fringe of DNAPL migration from the INT-11 area.

Soil samples were collected from INT-11B and INT-11C locations (Table 4). Including tentatively identified compounds and compounds identified below the detection limit, the soil samples from INT-11B contained 4.7 to 8.4 percent VOCs and 6.1 percent SVOCs; and from INT-11C, 3.2 to 3.3 percent VOCs and 2 percent SVOCs. The major VOC components are chloroform, 1,2-DCE, 1,2-DCA, carbon tetrachloride, and PCE.

The field observations and laboratory data presented support the conclusion that DNAPL from the lagoon area accumulated at the base of the S1 sand in the S1-11/INT-11 area, migrated downward through the thin or missing C1 clay (and, potentially, abandoned well REI-6-1) to the base of the INT interval, and then migrated down the dip of the C2 clay, mainly to the east-northeast. DNAPL residuals have been observed 10-15 feet to the south of INT-11 and are present over much of the area bounded by the INT-11 well, the floodgate, the sheetpile floodwall and the property fence. CPT soundings could not be completed south of the property boundary due to access difficulties. The extent of DNAPL appears to be defined to the east by its absence at S1-22, DB-19, and INT-11G, and to the southwest by its absence at DB-18. However, it is not defined to the south of INT-11.

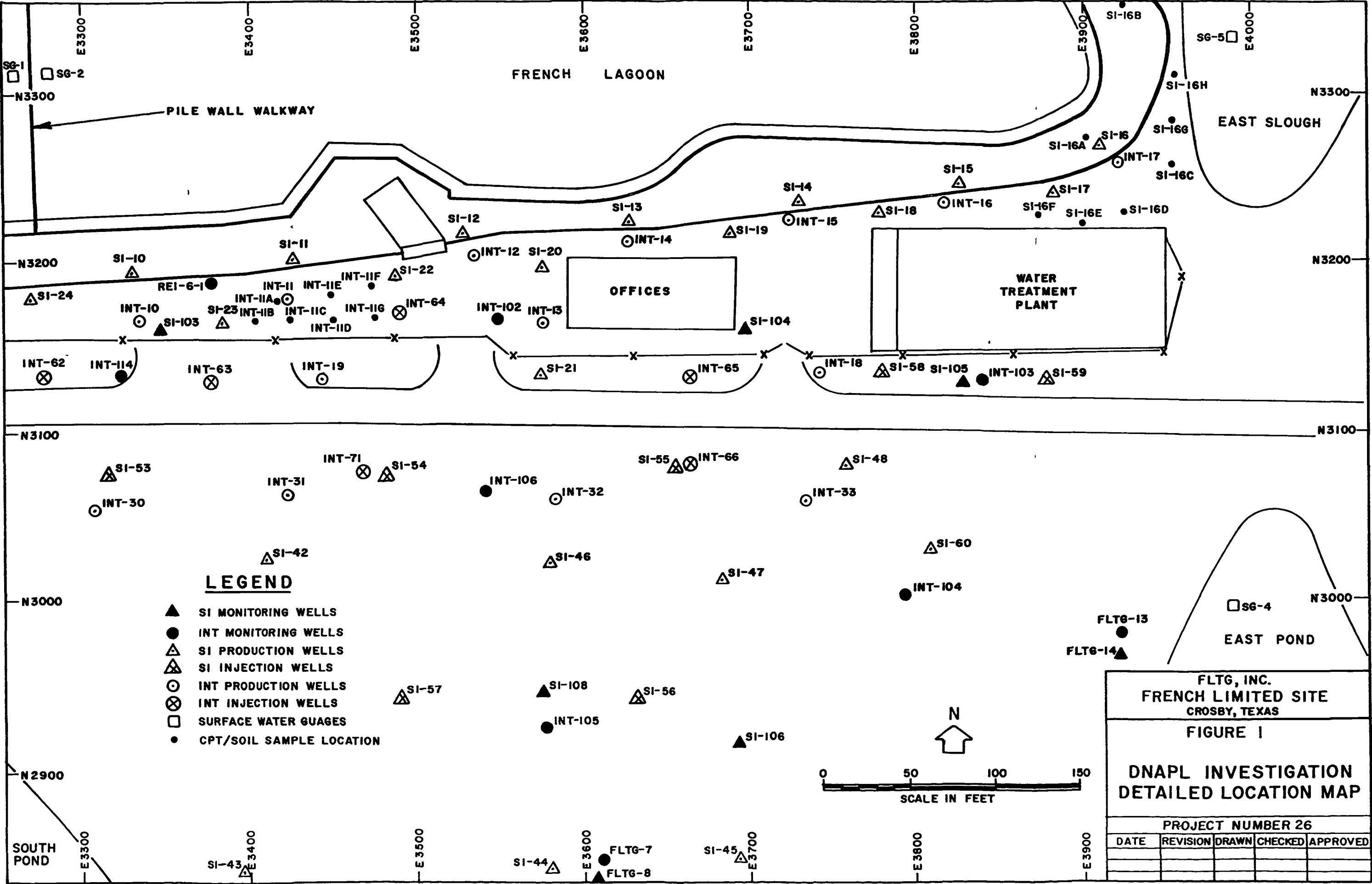
At INT-10, a less well-defined occurrence of DNAPL is indicated only by staining and odor (Figure 12). In this area, the C2 surface dips toward the west-southwest (Figure 11). DNAPLs probably entered the INT interval in the same manner as described above and followed the local structural gradient at the base of the INT interval toward INT-10 and DB-17.

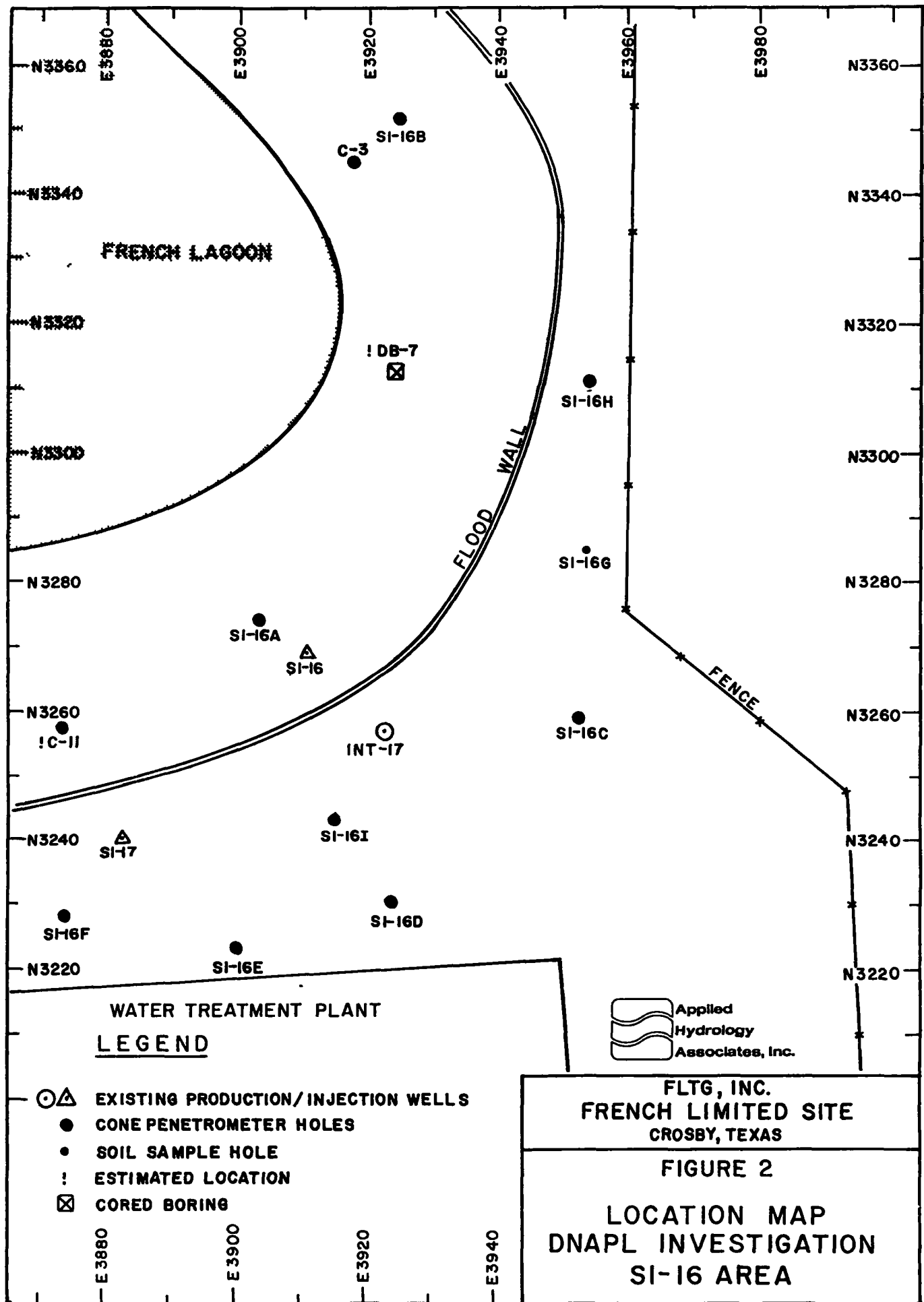
2.3 Area Inside Floodwall

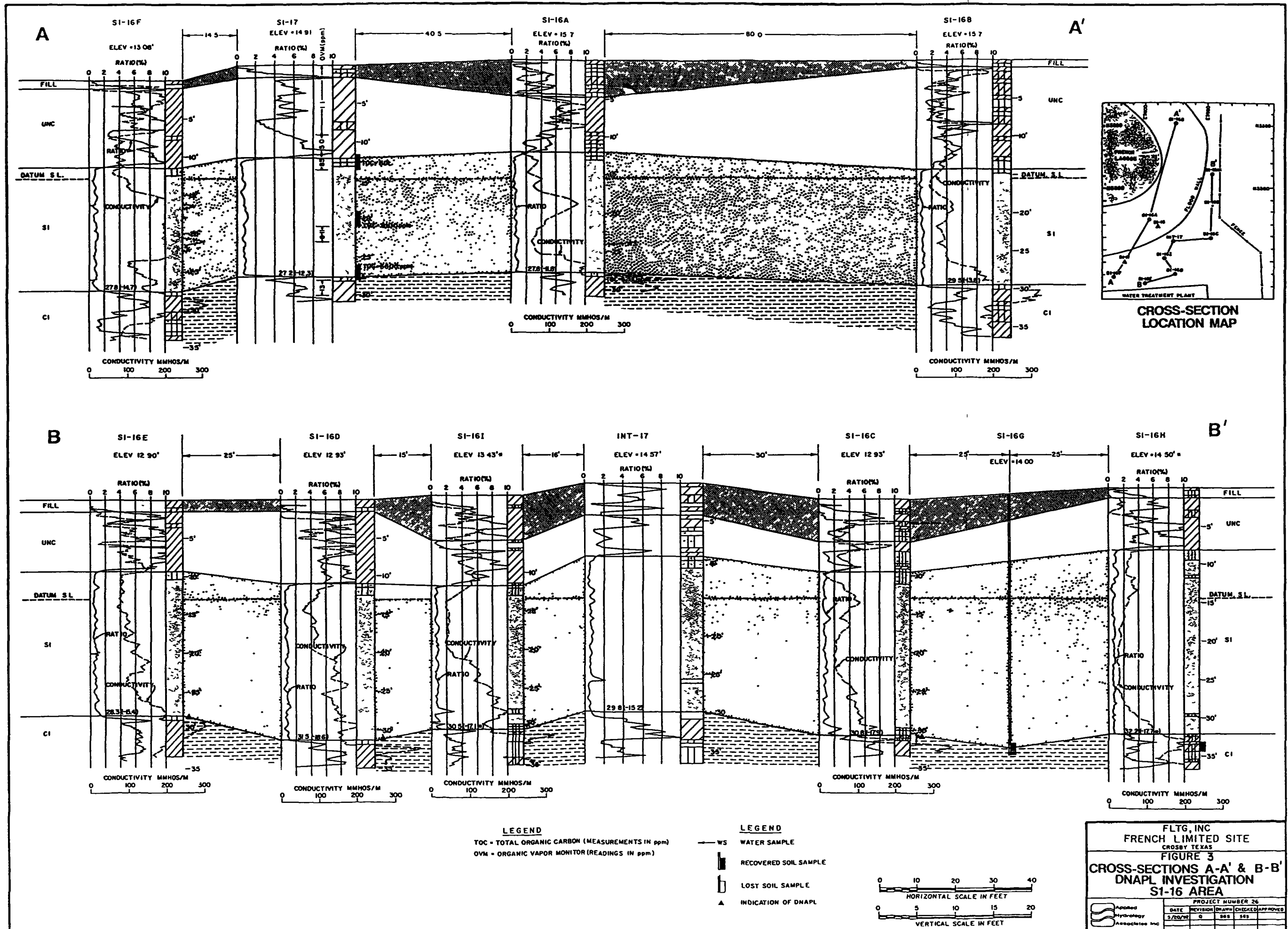
Additional observations were made during operation of the production well system after the April 1992 field investigation was complete. Since the April 1992 investigation, DNAPL has been reported at more wells inside the flood wall. In June 1992, DNAPL was observed in clogged well-head flow meters, pressure gauges, or bends in piping further down the system, at wells S1-4, S1-13, and S1-14. Samples from S1-4, S1-13, and S1-14 have been submitted for analysis for VOCs, SVOCs, TOC, and TOX. The detection of DNAPL at these wells is consistent with the conceptual model of DNAPL migration presented above, i.e., operation of the production wells inside the floodwall has pulled DNAPL previously underlying the lagoon toward those wells.

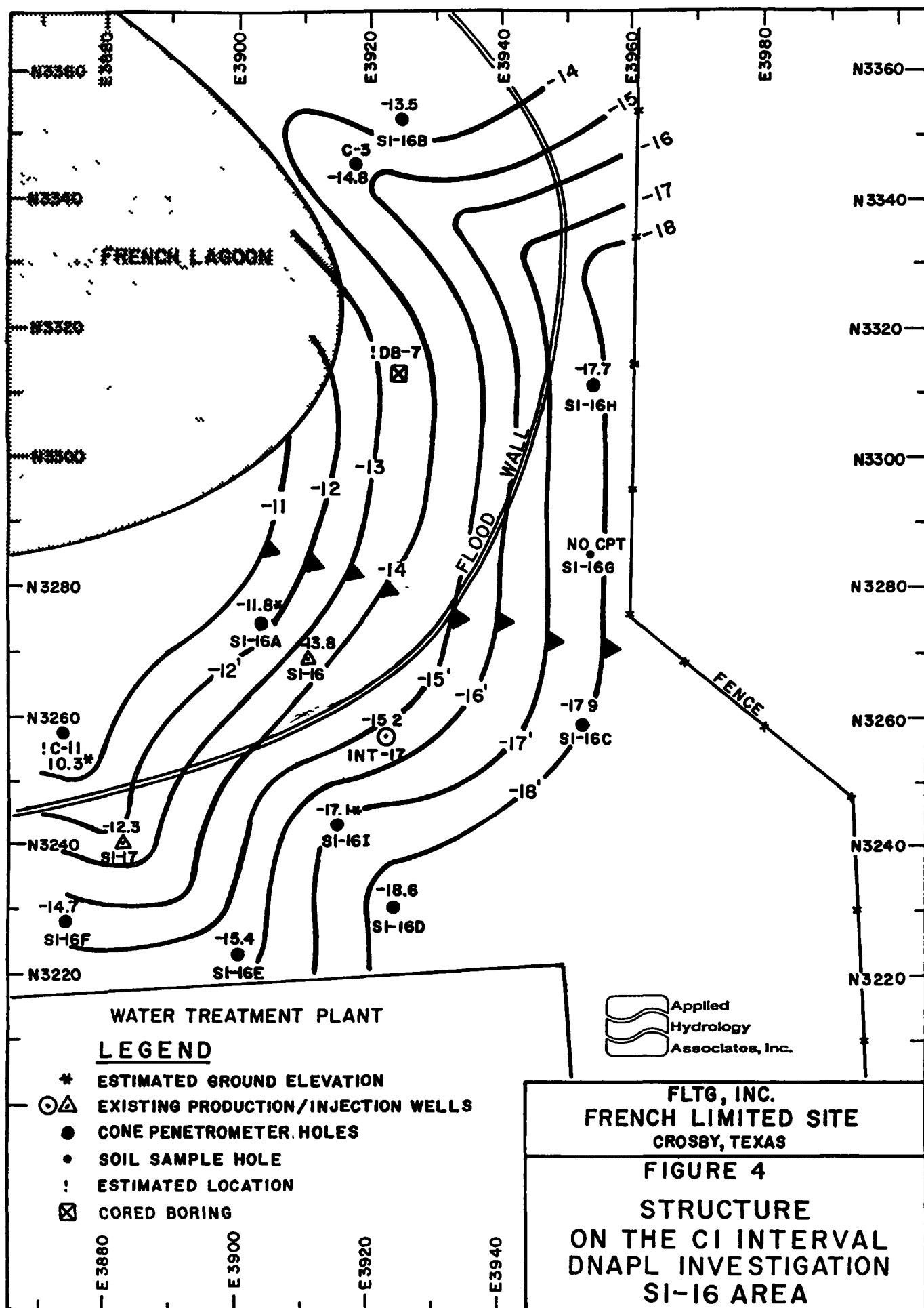
3.0 SUMMARY AND CONCLUSIONS

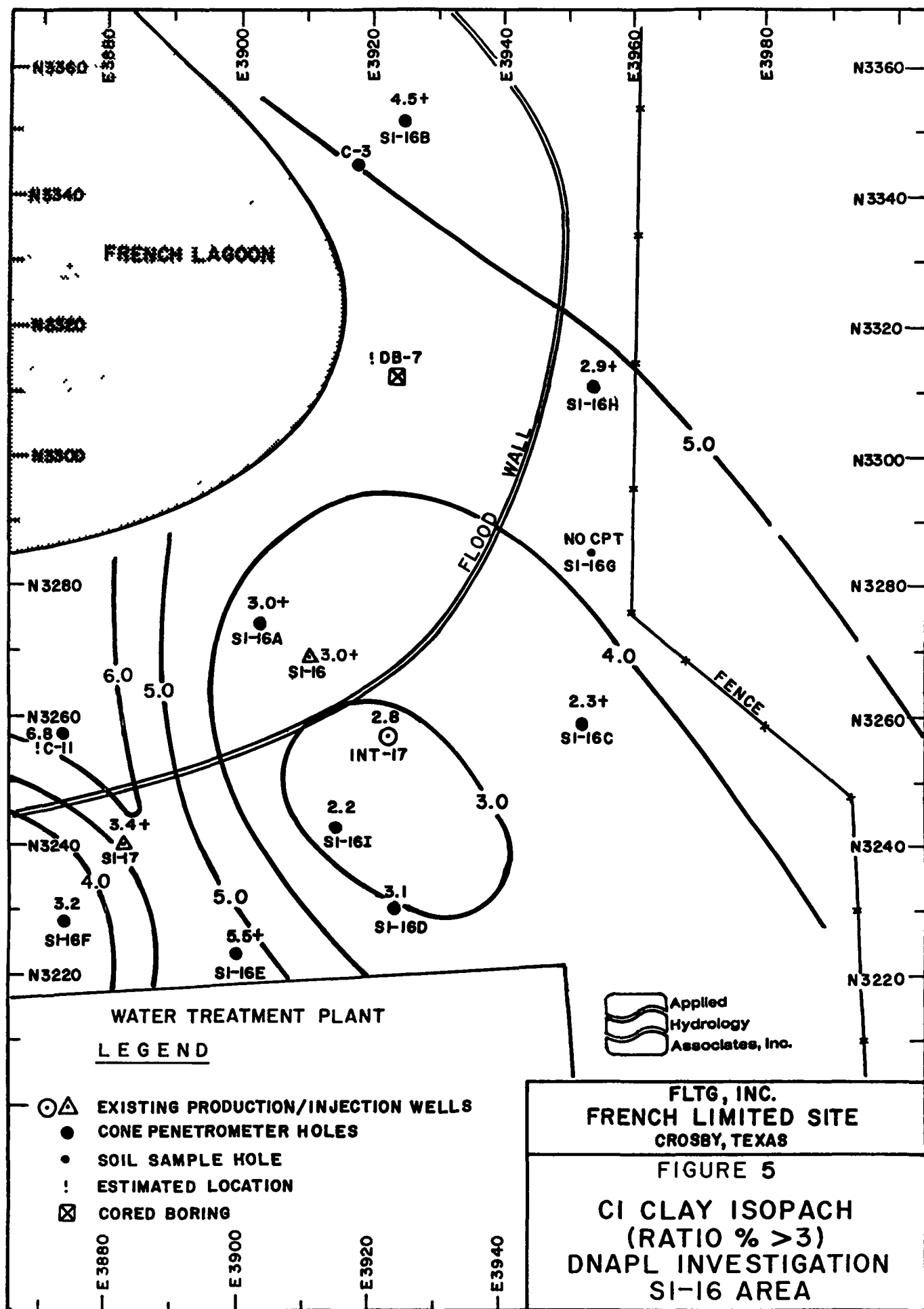
1. The April, 1992 field investigations combined with data from earlier investigations, confirms the presence of DNAPL residuals in soils outside the floodwall in the S1-16 and INT-11 areas. DNAPL appears to be concentrated at the base of the S1 unit in the S1- 16 area, and at the base of the INT unit in the INT-11 area. Similar suites of VOCs are detected in impacted soil samples, and in DNAPL samples.
2. The occurrence and distribution of observed DNAPL is consistent with DNAPL migration controlled primarily by the structural configuration of the C1 and C2 clay units.
3. More detailed soil and groundwater sampling needs to be performed in the S1-16 and INT-11 areas to fully define DNAPL distribution in these areas. Proposed locations for additional borings and DNAPL detection wells are shown on Figure 1. Details of proposed soil sampling and well installation will be presented in the *DNAPL Additional Investigation Work Plan*.

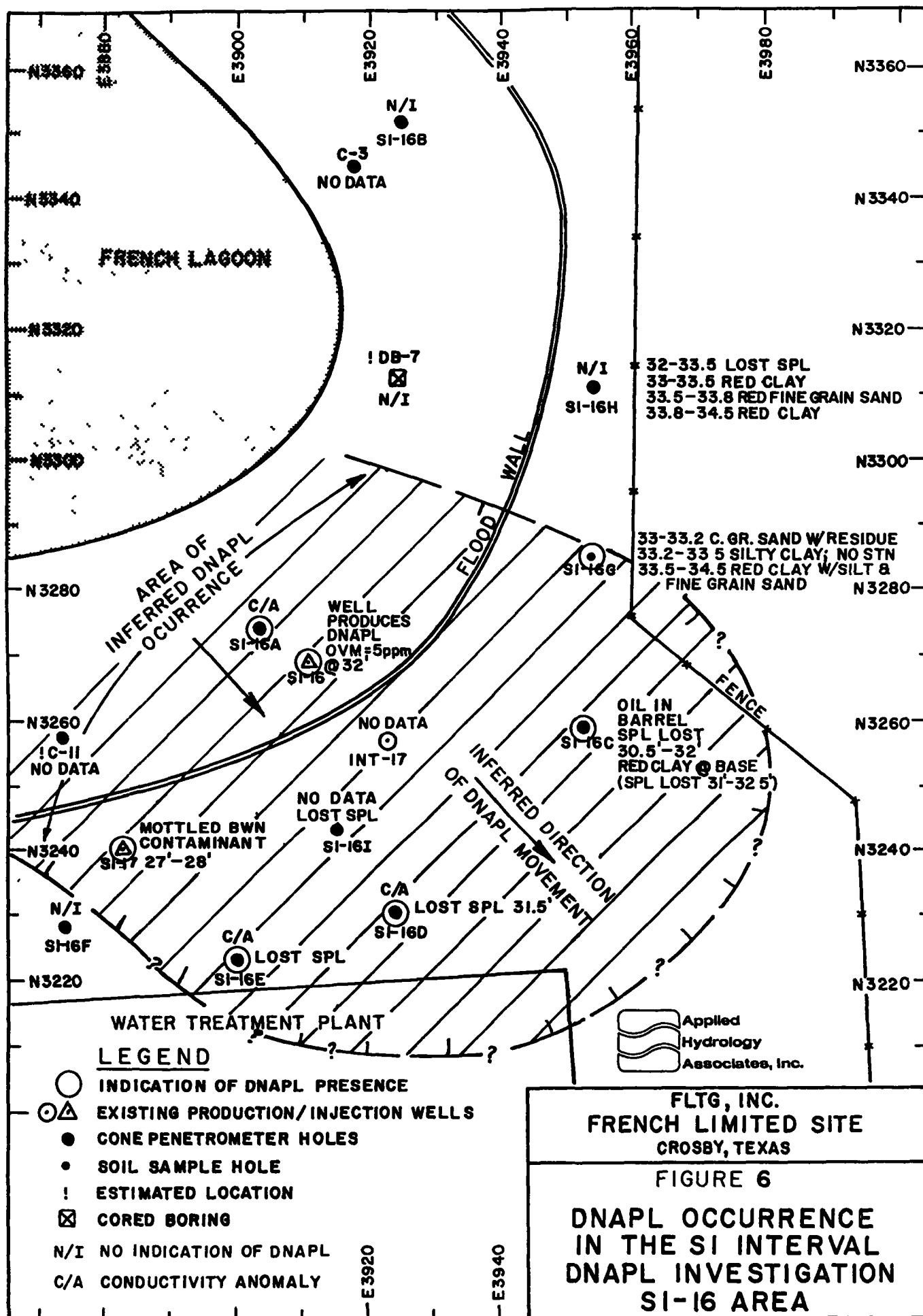


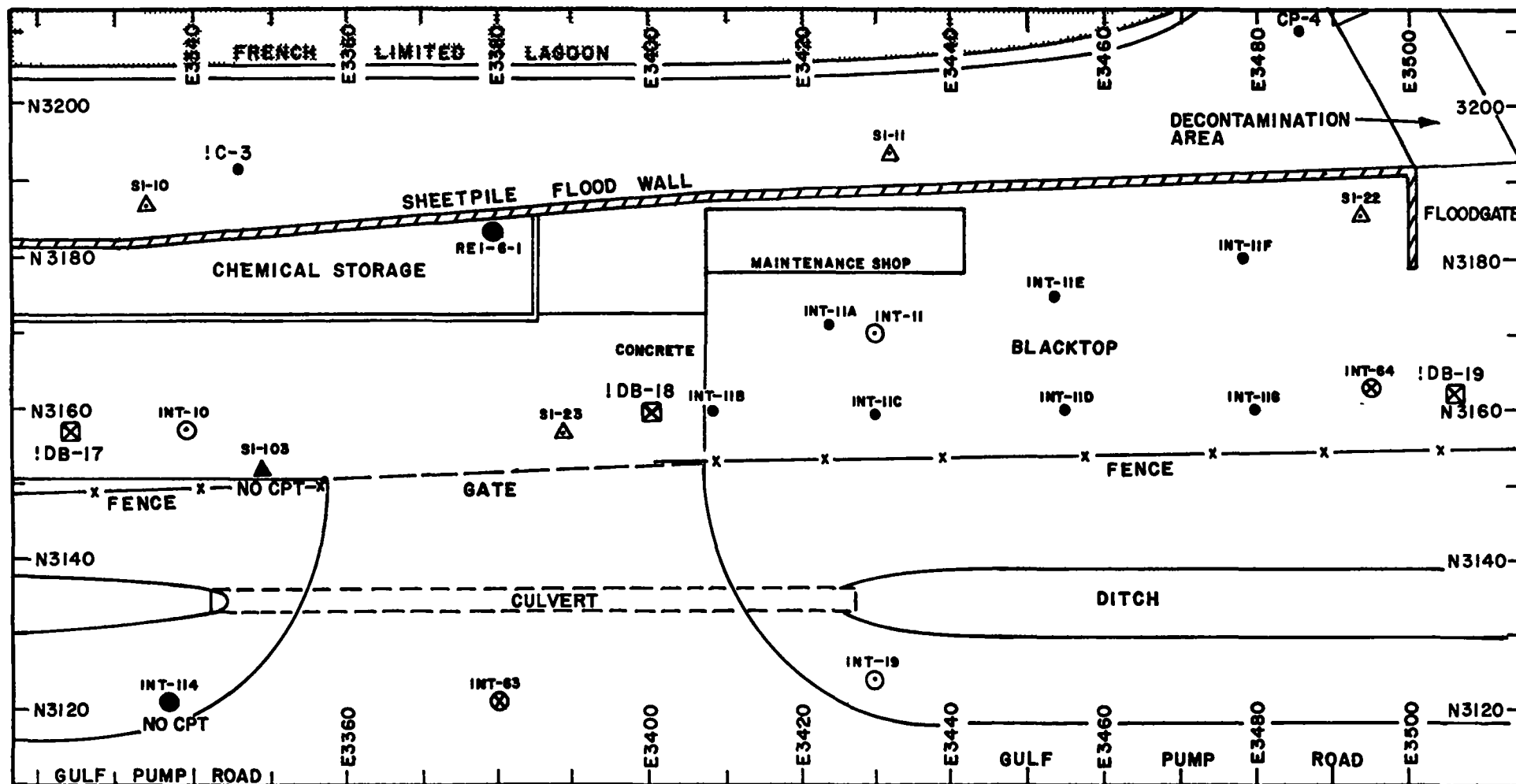












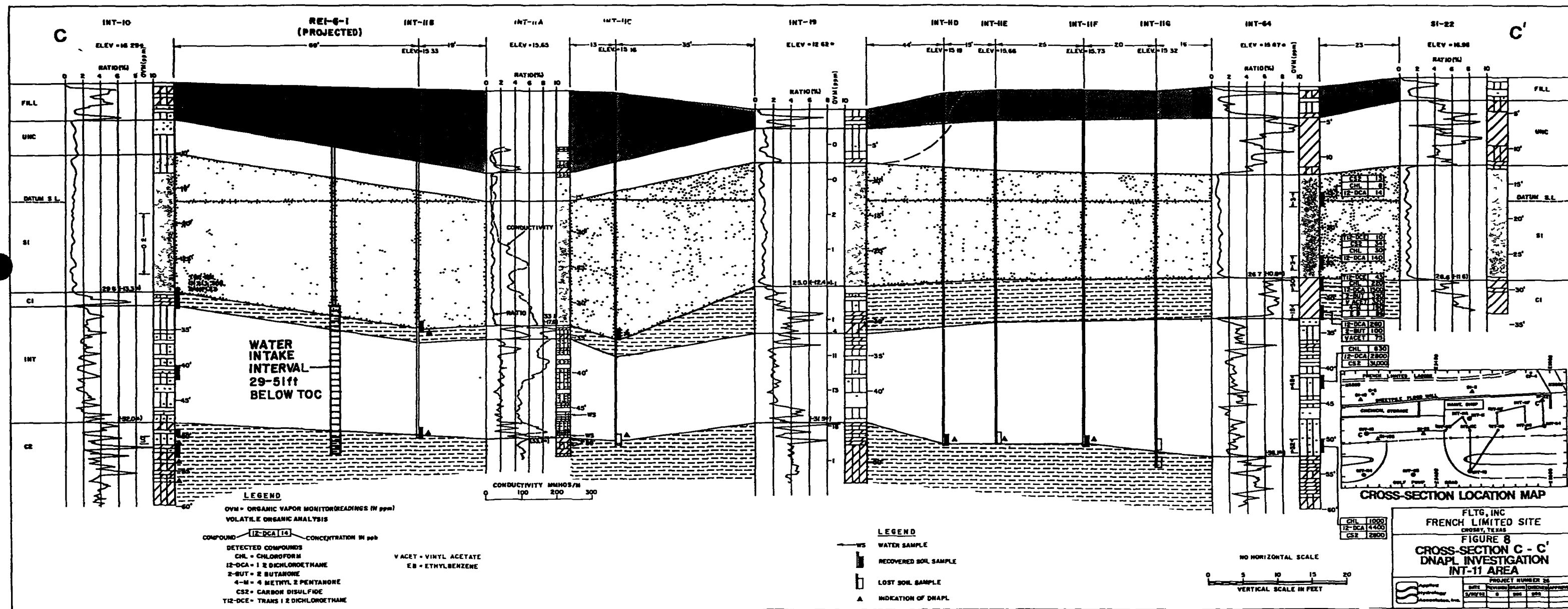
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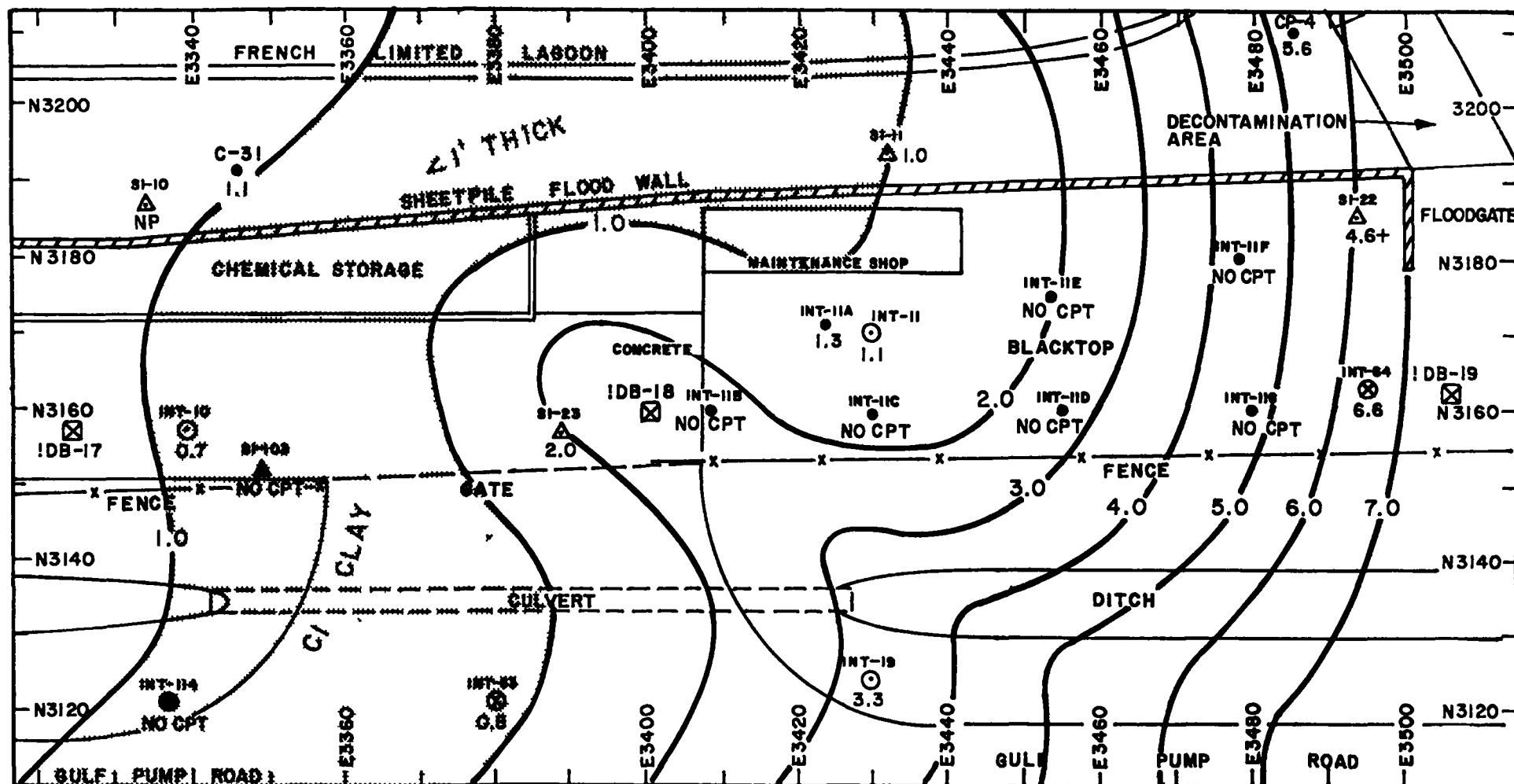
- N/P INT NOT PENETRATED
- ⊗⊙△ EXISTING PRODUCTION/INJECTION WELLS
- ▲● EXISTING MONITORING WELLS
- CONE PENETROMETER HOLES
- ! ESTIMATED LOCATION
- ⊠ CORED BORING
- N/I NO INDICATION OF DNAPL

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FIGURE 7

LOCATION MAP
DNAPL INVESTIGATION
INT-II AREA





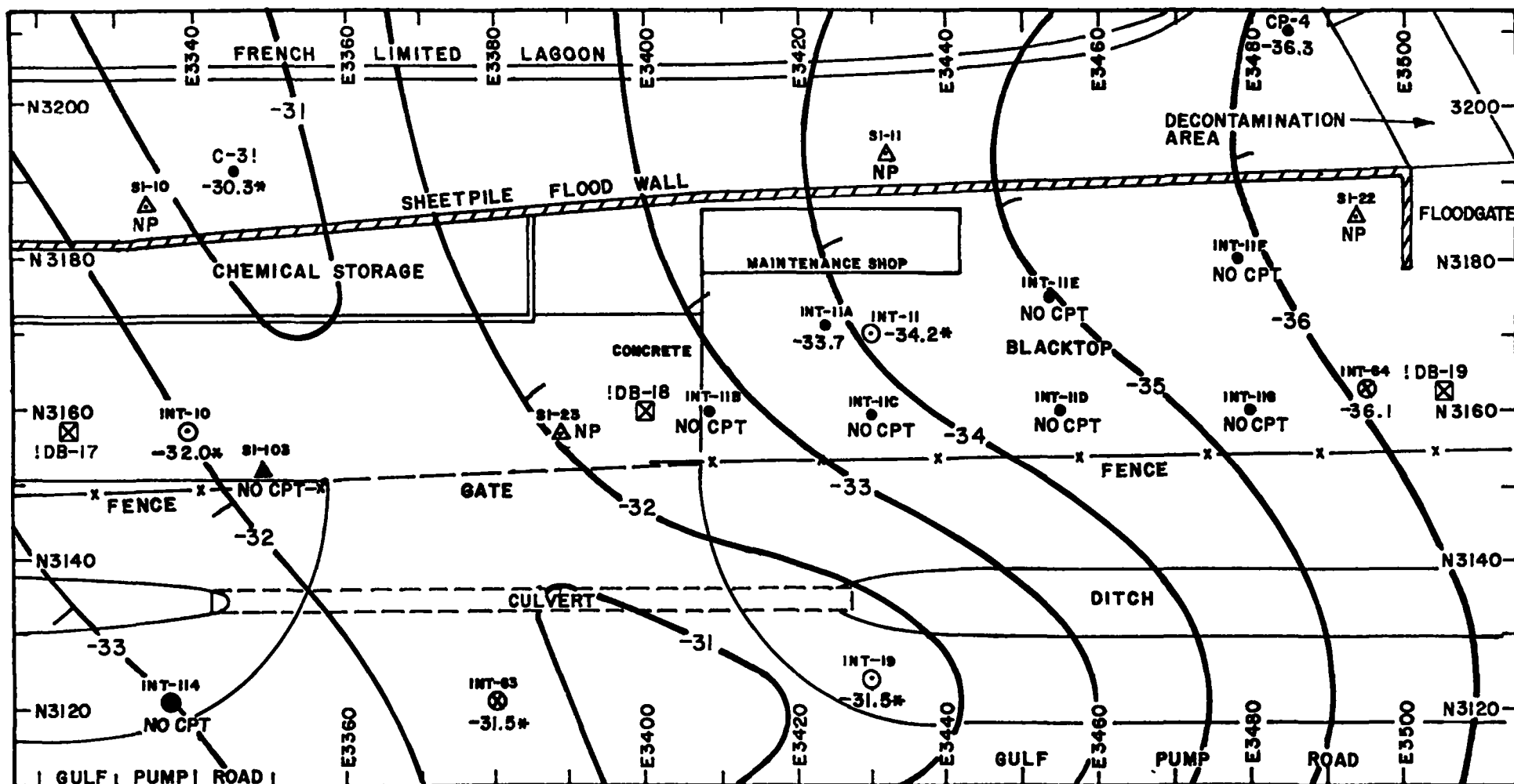
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- ⊗⊙⊠ EXISTING PRODUCTION/INJECTION WELLS
- ▲● EXISTING MONITORING WELLS
- CONE PENETROMETER HOLES
- NP CI NOT PENETRATED
- ! ESTIMATED LOCATION
- ⊠ CORED BORING

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FIGURE 9
CI CLAY ISOPACH
(RATIO % > 3)
DNAPL INVESTIGATION
INT-II AREA

FIGURE 10
STRUCTURE
ON THE CI INTERVAL
DNAPL INVESTIGATION
INT-11 AREA



LEGEND

* ESTIMATED GROUND LEVEL

⊗⊙⊠ EXISTING PRODUCTION/INJECTION WELLS

▲● EXISTING MONITORING WELLS

● CONE PENETROMETER HOLES

NP C2 NOT PENETRATED

! ESTIMATED LOCATION

⊠ CORED BORING

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FIGURE II
STRUCTURE
ON THE C2 INTERVAL
DNAPL INVESTIGATION
INT-II AREA

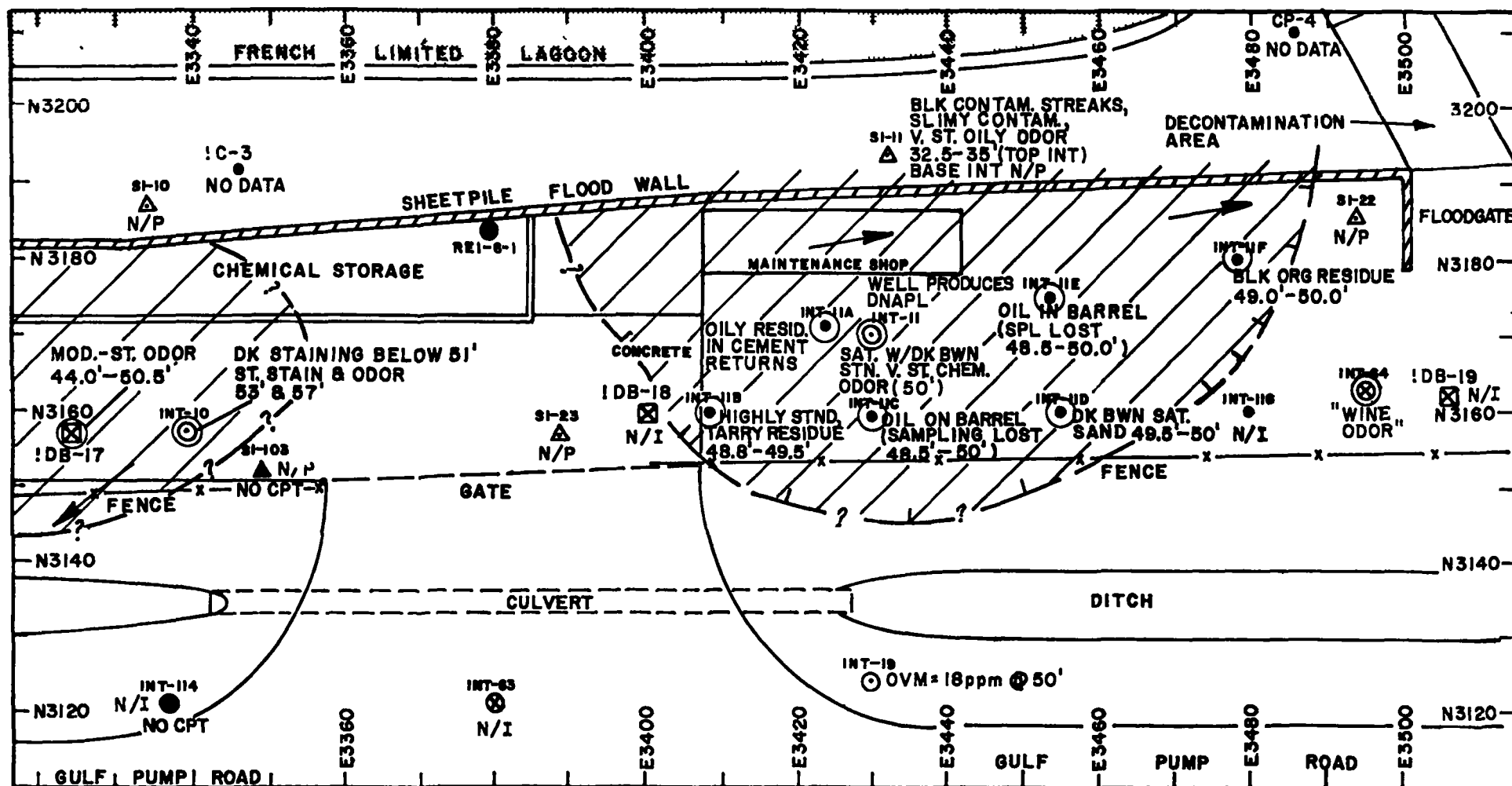


TABLE 1
SUMMARY OF SOIL SAMPLE ANALYSES
S1-16 AND INT-11 AREAS

WELL	Depth	TOC(ppm)	TPH(ppm)
INT-10	29-30'	BDL	NA
	30-31.5'	BDL	NA
	41-42'	BDL	NA
	50-51'	BDL	NA
	52-53'	BDL	NA
S1-17	11 5-13.5'	BDL	NA
	19-21'	8100	NA
	26-28' (27')	6600	NA
INT-64	15-17'	NA	BDL
	24-26'	NA	BDL
	27-29'	NA	BDL
	31-32'	NA	BDL
	41-43'	NA	BDL
	50-52'	NA	BDL

TABLE 2

SAMPLE DESCRIPTIONS
S1-16 AND INT-11 AREAS

S1-16A	24'	Water sample. No recovered DNAPL.
	28'	Water sample. No recovered DNAPL.
S1-16C	31-32.5'	Barrel did not open. Red clay at base of sampler.
	30.5-32'	Moved 2 feet. Lost sample. Mostly sand. Oil remnant in core barrel.
S1-16G	33-33.2'	Sand, gray to blk., m. to c. gr.. Chemical smell, residual DNAPL. No evidence of mobile product.
	33.2-33.5'	Clay, white, silty, with nodules. Chemical smell but no visible staining.
	33.5-34.5	Clay, red, mottled with gray silt and f. gr. sand. No DNAPL evident
S1-16H	33-33.5'	Clay, red. No DNAPL
	33.5-33.8'	Sand, red, f. gr., No DNAPL.
	33.8-34.5'	Clay, red. No DNAPL.
INT-11A	46'	Water sample. No recovered DNAPL
	49'	Water sample. No recovered DNAPL.
INT-11B	33-34'	Sand, gray, f. gr., clean
	34-34.5'	Sand, silty, gray, with thin tan-red clay streaks. Black carbonaceous streaks Smelled of chemicals but no reading on OVM.
	48-48.8'	Sand, gray, f. gr., chemical odor but no visible staining.
	48.8-49.5'	Sand, highly stained, organics in fine stratifications Organic is residual, tarry texture, not fluid although can be mobilized when wet.
INT-11C	33.5-35'	Sand, lt gray, f. gr, chemical odor. Spotty, "concretion-like" nodules of organic residual. Noted brownish discoloration in isolated stratified zones which cleave easily. No noticeable grain size difference.
	48.5-50'	Lost soil sample. Oil residue on barrel.
INT-11D	48.5-49.5'	Sand, gray, f. gr., compacted. Chemical odor and light brown chemical staining evident.
	49.5-50'	Sand, dc. bwn., f. gr., organic saturated, above clayey silt to f. gr. sand. Organic material tends to accentuate stratification in f gr sands. Organic staining peters out in underlying silty/clayey zone.
INT-11E	48 5-50'	Lost soil sample. Core barrel had an oily residue.
INT-11F	49-50'	Sand, f. to m. gr. Impregnated with black organic residue material High clay content Sample dense but malleable. No evidence of free liquid organics. Organic appears to be immobile.
	50-50.5'	Clay, dk. bwn., interbedded with silt and f. gr. sand. Organic residual does not penetrate into clay, but some of the silt/f gr. sand streaks are stained.
INT-11G	49-50.5'	Lost soil sample. No evidence of oil in soil barrel.
	51.5-53'	Lost soil sample. No evidence of oil in soil barrel

TABLE 3

VOLATILE ORGANIC ANALYSIS - WELL INT-64
INT-11 AREA

Well INT-64	15-17'	24-26'	27-29'	31-32'	41-43'	50-52'
Parameter	ppb	ppb	ppb	ppb	ppb	ppb
Chloromethane	BDL	BDL	BDL	BDL	BDL	BDL
Bromomethane	BDL	BDL	BDL	BDL	BDL	BDL
Vinyl Chloride	BDL	BDL	BDL	BDL	BDL	BDL
Chloroethane	BDL	BDL	BDL	BDL	BDL	BDL
Methylene Chloride	61	130	120	110	*4900	*5100
Acetone	24	12	*1900	*560	2400	3400
Carbon Disulfide	13	34	BDL	BDL	31000	2800
1,1-Dichloroethene	BDL	BDL	BDL	BDL	BDL	BDL
1,1-Dichloroethane	BDL	BDL	BDL	BDL	BDL	BDL
Trans 1,2-Dichloroethene	BDL	10	43	BDL	BDL	BDL
Chloroform	8	30	220	BDL	830	1000
1,2-Dichloroethane	14	140	1500	260	2800	4400
2-Butanone	BDL	BDL	390	100	BDL	BDL
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL	BDL	BDL
Carbon Tetrachloride	BDL	BDL	BDL	BDL	BDL	BDL
Vinyl Acetate	BDL	BDL	320	75	BDL	BDL
Bromodichloromethane	BDL	BDL	BDL	BDL	BDL	BDL
1,2-Dichloropropane	BDL	BDL	BDL	BDL	BDL	BDL
Cis 1,3-Dichloropropene	BDL	BDL	BDL	BDL	BDL	BDL
Trichloroethene	BDL	BDL	BDL	BDL	BDL	BDL
Dibromochloromethane	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2-Trichloroethane	BDL	BDL	BDL	BDL	BDL	BDL
Benzene	BDL	BDL	BDL	BDL	BDL	BDL
Trans 1,3-Dichloropropene	BDL	BDL	BDL	BDL	BDL	BDL
2-Chloroethylvinylether	BDL	BDL	BDL	BDL	BDL	BDL
Bromoform	BDL	BDL	BDL	BDL	BDL	BDL
4-Methyl 2-Pentanone	BDL	BDL	190	BDL	BDL	BDL
2-Hexanone	BDL	BDL	BDL	BDL	BDL	BDL
Tetrachloroethene	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL	BDL	BDL	BDL
Toluene	BDL	BDL	BDL	BDL	BDL	BDL
Chlorobenzene	BDL	BDL	BDL	BDL	BDL	BDL
Ethylbenzene	BDL	BDL	86	BDL	BDL	BDL
Styrene	BDL	BDL	BDL	BDL	BDL	BDL
Total Xylenes	BDL	BDL	BDL	BDL	BDL	BDL

* Compound Detected in the QC Blank

TABLE 3

VOLATILE ORGANIC ANALYSES - WELL INT-64
INT-11 AREA

Well INT-64	15-17'	24-26'	27-29'	31-32'	41-43'	50-52'	DNAPL (1)
PARAMETER	ppb	ppb	ppb	ppb	ppb	ppb	mg/l
TOC	NA	NA	NA	NA	NA	NA	506
TOX	NA	NA	NA	NA	NA	NA	595
Volatile Organics:							
Chloromethane	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Bromomethane	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Vinyl Chloride	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloroethane	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Methylene Chloride	61	130	120	110	4900 (2)	5100 (2)	20,000 (3)
Acetone	24	12	1900 (2)	560 (2)	2400	3400	BDL
Carbon Disulfide	13	34	BDL	BDL	31000	2800	BDL
1,1-Dichloroethene	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1-Dichloroethane	BDL	BDL	BDL	BDL	BDL	BDL	20,000 (3)
Trans 1,2-Dichloroethene	BDL	10	43	BDL	BDL	BDL	2,100 (3)
Chloroform	8	30	220	BDL	830	1000	810,000
1,2-Dichloroethane	14	140	1500	260	2800	4400	650,000
2-Butanone	BDL	BDL	390	100	BDL	BDL	23,000 (3)
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Carbon Tetrachloride	BDL	BDL	BDL	BDL	BDL	BDL	31,000 (3)
Vinyl Acetate	BDL	BDL	320	75	BDL	BDL	150,000
Bromodichloromethane	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2-Dichloropropane	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Cis 1,3-Dichloropropene	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Trichloroethene	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Dibromochloromethane	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2-Trichloroethane	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzene	BDL	BDL	BDL	BDL	BDL	BDL	4,400 (3)
Trans 1,3-Dichloropropene	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Chloroethylvinylether	BDL	BDL	BDL	BDL	BDL	BDL	NA
Bromoform	BDL	BDL	BDL	BDL	BDL	BDL	BDL
4-Methyl 2-Pentanone	BDL	BDL	190	BDL	BDL	BDL	27,000 (3)
2-Hexanone	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Tetrachloroethene	BDL	BDL	BDL	BDL	BDL	BDL	18,000 (3)
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL	BDL	BDL	BDL	19,000 (3)
Toluene	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chlorobenzene	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Ethylbenzene	BDL	BDL	86	BDL	BDL	BDL	BDL
Styrene	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Total Xylenes	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Notes

(1) Sample SPEC-015 collected 4/8/92

(2) Compound detected in the QC Blank

(3) Detected at a concentration below the detection limit

TABLE 4

ANALYSIS OF DNAPL SAMPLES FROM INT-11B AND INT-11C

Analyte:	INT-11B mg/kg	INT-11B(dup) mg/kg	INT-11C mg/kg
Total organic carbon	38,900	39,200	31,700
Total organic halogens	80,300	79,000	112,000
Total petroleum hydrocarbons	97,100		69,500

VOCs	INT-11B (1.1.6) mg/kg	INT-11B (1.310) mg/kg	INT-11C (1.1.6) mg/kg	INT-11C (1.310) mg/kg
Vinyl chloride	8J			
Chloroethane	140		5J	
Methylene chloride	210		49	
Acetone				2100J
Carbon disulfide	16		3J	
1,1-Dichloroethene	300		50	
1,1-Dichloroethane	970	520J	380	
1,2-Dichloroethene (total)	7,200	5,000	2,900	
Chloroform	12,000	27,000	8,700	9,200
1,2-Dichloroethane	13,000	12,000	9,100	9,200
2-Butanone			18	
1,1,1-Trichloroethane			4J	
Carbon tetrachloride	7,000	26,000	5,600	7,500
Trichloroethene	700	700J	480	
1,1,2-Trichloroethane	12		8J	
Benzene	27		21	
4-Methyl-2-pentanone	54		40	
2-Hexanone	7J		4J	
Tetrachloroethene	3,700	13,000	3,500	4,500
1,1,2,2-Tetrachloroethane	130		100	
Toluene	90		51	
Ethylbenzene	87		54	
Xylenes (total)	250		170	
Tentatively Identified:				
Ethane, pentachloro-	690		340	

SVOCs	INT-11B mg/kg		INT-11C mg/kg	
Hexachloroethane	5,800J		2,200J	
Naphthalene	1,600J		660J	
Hexachlorobutadiene	38,000		17,000	
2-Methylnaphthalene	350J			
Acenaphthene	610J			
Dibenzofuran	360J			
Fluorene	600J			
Phenanthrene	1,000J		410J	
Tentatively Identified.				
1,3-Butadiene, pentachloro-	5,900			
Aliphatic hydrocarbon	7,300			

Only compounds detected are shown
J = present, but below the detection limit

Summary

Total VOCs (inc J)	INT-11B (1.1.6) mg/kg	INT-11B (1.310) mg/kg	INT-11C (1.1.6) mg/kg	INT-11C (1.310) mg/kg
	46,591	84,220	31,577	32,500

Total SVOCs (inc J)	INT-11B mg/kg		INT-11C mg/kg	
	61,520		20,270	

BOOKMARK

:

072450

Appendix 1

**Analytical Reports
S1-16 DNAPL sample**

072451

Report
Prepared
for

FLTG , INC .
1024 GULF PUMP ROAD.
CROSBY TX 77532

Attention : Ted Davis

TO: 430 VIA: Courier
RECEIVED

FEB 14 1992

INT. M.F. E.C.

by

Keystone Lab - Houston
A Division of CHESTER LabNet
8300 Westpark Drive
Houston, Texas 77063
(713) 266-6800

CERTIFIED BY : Daniel D. Pastalaniec

Dan Pastalaniec
Project Manager

IAH 3/16/92

PROJECT ID :
P.O. NUMBER : SPEC001-01

WORK ORDER : H92-01.331
DATE RECEIVED : 30-JAN-1992

SAMPLE & ANALYSIS SUMMARY

Keystone Sample ID	Client's Sample Number	Date/Time Collected	Sample Matrix
H92-01.331-001	LAB BLANK		WATER
H92-01.331-002	SPEC0001-01	01/30/92 08:45	WATER

Volatiles

Date analyzed | Dilution | Analyst

02/07/92	500K	PAA
----------	------	-----

Semivolatiles

Date analyzed | Dilution | Analyst

02/06/92	100	JDD
----------	-----	-----

Int Vol BN	Fin Vol	EXT date	Analyst	Int Vol A	Fin Vol	EXT date
1g	10 ml	01/25/92	BPC			

Surrogate # | Date Prep. |

6226A	01/25/92
-------	----------

COMMENTS: This sample was done as a waste dilution. There is about 5% free water in the sample and all of the rest appears to be soluble in methylene chloride.

072453

ORGANICS ANALYSIS DATA SHEET

LABORATORY NAME: KEYSTONE ENV.

CASE NO.: ----

SAMPLE ID NO.: 910133102

INITIAL CALIBRATION DATE: 02/05/92

SAMPLE MATRIX: WATER

CONTRACT NO.: --

DATA RELEASE AUTHORIZED BY: *RE*

DATE SAMPLE RECEIVED: 01/30/92

VOLATILES

CONCENTRATION: LOW

DATAFILE: 4U01331V02B

DATE ANALYZED: 02/07/92

DILUTION FACTOR: 500.00K

COMPOUND	DETECTION LIMIT (MILLIGRAMS / LITER)	AMOUNT FOUND
C010 CHLOROMETHANE	5000 U	
C015 BROMOMETHANE	5000 U	
C020 VINYL CHLORIDE	5000 U	
C025 CHLOROETHANE	5000 U	
C030 METHYLENE CHLORIDE	2500 U	
C035 ACETONE	5000 U	
C040 CARBON DISULFIDE	2500 U	
C045 1,1-DICHLOROETHENE	2500 U	
C050 1,1-DICHLOROETHANE	2500	2000 J
C053 1,2-DICHLOROETHENE (TOTAL)	2500	2300 J
C060 CHLOROFORM	2500	78000
C065 1,2-DICHLOROETHANE	2500	65000
C110 2-BUTANONE	5000 U	
C115 1,1,1-TRICHLOROETHANE	2500 U	
C120 CARBON TETRACHLORIDE	2500	20000
C125 VINYL ACETATE	5000 U	
C130 BROMODICHLOROMETHANE	2500 U	
C140 1,2-DICHLOROPROPANE	2500 U	
C143 CIS-1,3-DICHLOROPROPENE	2500 U	
C150 TRICHLOROETHENE	2500 U	1000 J
C155 DIBROMOCHLOROMETHANE	2500 U	
C160 1,1,2-TRICHLOROETHANE	2500 U	
C165 BENZENE	2500 U	
C172 TRANS-1,3-DICHLOROPROPENE	2500 U	
C180 BROMOFORM	2500 U	
C205 4-METHYL-2-PENTANONE	5000 U	
C210 2-HEXANONE	5000 U	
C220 TETRACHLOROETHENE	2500 U	
C225 1,1,2,2-TETRACHLOROETHANE	2500 U	
C230 TOLUENE	2500 U	780 J
C235 CHLOROBENZENE	2500 U	
C240 ETHYLBENZENE	2500 U	
C245 STYRENE	2500 U	
C250 XYLENES (TOTAL)	2500	1900 J

U = UNDETECTED AT THE LISTED DETECTION LIMIT

J = COMPOUND IS PRESENT, BUT BELOW THE LISTED DETECTION LIMIT

072454

VOA QUANTITATION REPORT

SAMPLE ID. SPEC0001-01 SI-16

F NAME 4U01331V02B

INST 4000

CLIENT FRENCH

ANALYST PVG

DATE INJECTED 02/07/92 17:39:00

VERIFIED BY

CALIB STD DATE 02/05/92

CORR. FACTOR 500.00

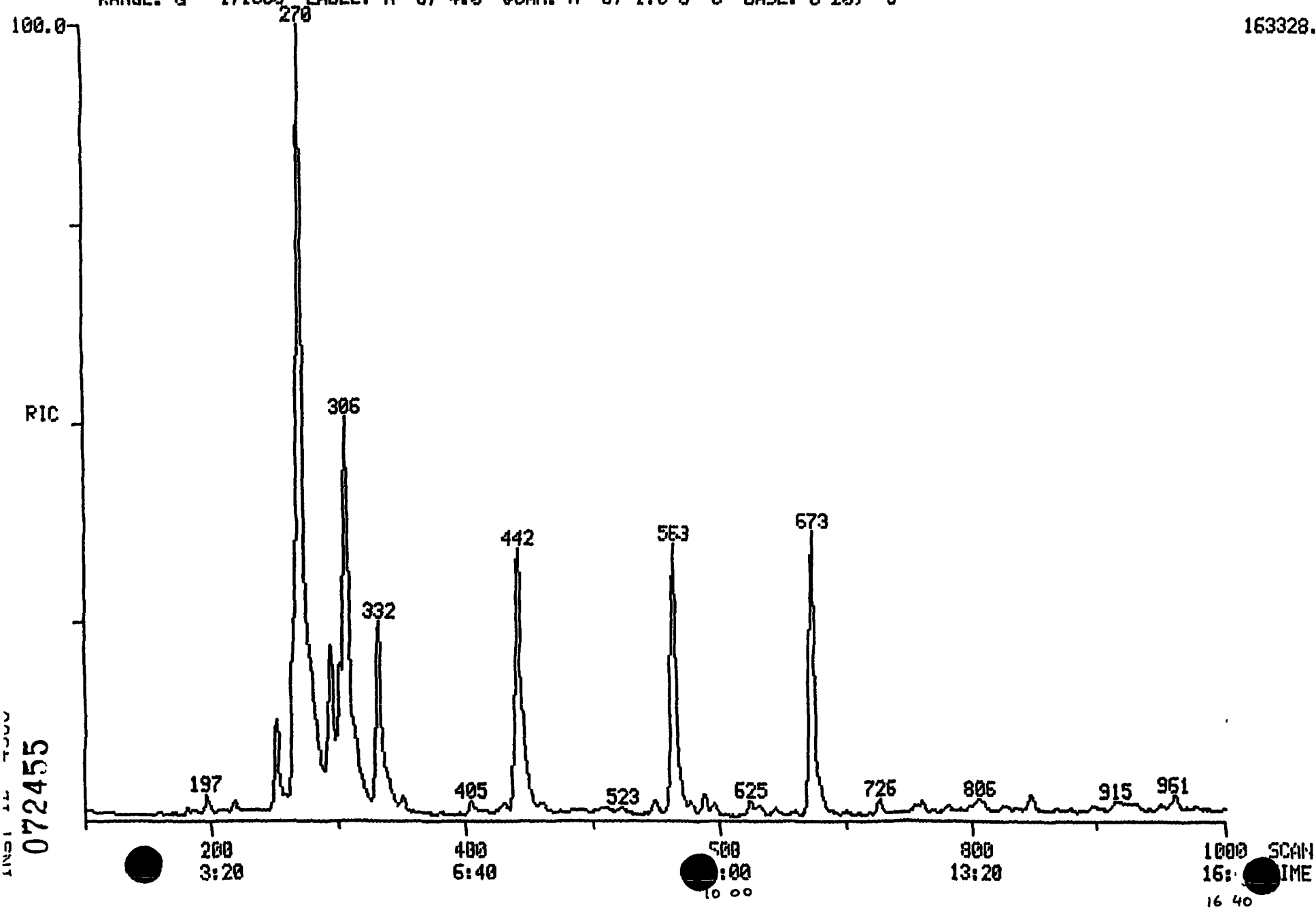
						Unit: mg/L		
SCAN#	VOA COMPOUNDS	M/E	AMOUNT	RRT	AREA			
265 CI01	BROMOCHLOROMETHANE **IS1**	128	25000 ug/L	1.000	20114			
332 CI10	1,4-DIFLUOROBENZENE **IS2**	114	25000 ug/L	1.000	90281			
563 CI20	D5-CHLOROBENZENE **IS3**	117	25000 ug/L	1.000	87165			
302 CS15	D4-1,2-DICHLOROETHANE **SU1**	65	127 %	1.140	50050			
442 CS05	D8-TOLUENE **SU2**	98	106 %	1.331	104401			
673 CS10	P-BROMOFLUOROBENZENE **SU3**	95	104 %	1.195	60747			
219 C050	1,1-DICHLOROETHANE	63	1955 ug/L	0.826	7158			
197 C053	1,2-DICHLOROETHENE (TOTAL)	96	2335 ug/L	0.743	3123			
270 C060	CHLOROFORM	83	78482 ug/L	1.019	296925			
307 C065	1,2-DICHLOROETHANE	62	65300 ug/L	1.158	152113			
294 C120	CARBON TETRACHLORIDE	117	19822 ug/L	0.886	46221			
588 C250	XYLENES (TOTAL)	106	1855 ug/L	1.044	6550			

RIC
02/07/92 17:39:00
SAMPLE: SPEC0001-01 SI-16
CONDS.: 01/30/92
RANGE: G 1,1000

DATA: 4U01331U02B #1
CALI: 4U01331U02B #3
SCANS 100 TO 1000

LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3

163328.



072456

ORGANICS ANALYSIS DATA SHEET

LABORATORY NAME: KEYSTONE ENV.

SAMPLE ID NO.: 910133101

SAMPLE MATRIX: WATER

DATA RELEASE AUTHORIZED BY: *AG*

CASE NO.: ----

INITIAL CALIBRATION DATE: 02/05/92

CONTRACT NO.: --

DATE SAMPLE RECEIVED: ----

VOLATILES

CONCENTRATION: LOW

DATE ANALYZED: 02/07/92

DATAFILE: EB0207V01

DILUTION FACTOR: 1.00

COMPOUND	DETECTION	AMOUNT
	LIMIT (MICROGRAMS / LITER)	FOUND
C010 CHLOROMETHANE	10 U	
C015 BROMOMETHANE	10 U	
C020 VINYL CHLORIDE	10 U	
C025 CHLOROETHANE	10 U	
C030 METHYLENE CHLORIDE	5 U	
C035 ACETONE	10	4 J
C040 CARBON DISULFIDE	5 U	
C045 1,1-DICHLOROETHENE	5 U	
C050 1,1-DICHLOROETHANE	5 U	
C053 1,2-DICHLOROETHENE (TOTAL)	5 U	
C060 CHLOROFORM	5 U	
C065 1,2-DICHLOROETHANE	5 U	
C110 2-BUTANONE	10 U	
C115 1,1,1-TRICHLOROETHANE	5 U	
C120 CARBON TETRACHLORIDE	5 U	
C125 VINYL ACETATE	10 U	
C130 BROMODICHLOROMETHANE	5 U	
C140 1,2-DICHLOROPROPANE	5 U	
C143 CIS-1,3-DICHLOROPROPENE	5 U	
C150 TRICHLOROETHENE	5 U	
C155 DIBROMOCHLOROMETHANE	5 U	
C160 1,1,2-TRICHLOROETHANE	5 U	
C165 BENZENE	5 U	
C172 TRANS-1,3-DICHLOROPROPENE	5 U	
C180 BROMOFORM	5 U	
C205 4-METHYL-2-PENTANONE	10 U	
C210 2-HEXANONE	10 U	
C220 TETRACHLOROETHENE	5 U	
C225 1,1,2,2-TETRACHLOROETHANE	5 U	
C230 TOLUENE	5 U	
C235 CHLOROBENZENE	5 U	
C240 ETHYLBENZENE	5 U	
C245 STYRENE	5 U	
C250 XYLENES (TOTAL)	5 U	

U = UNDETECTED AT THE LISTED DETECTION LIMIT

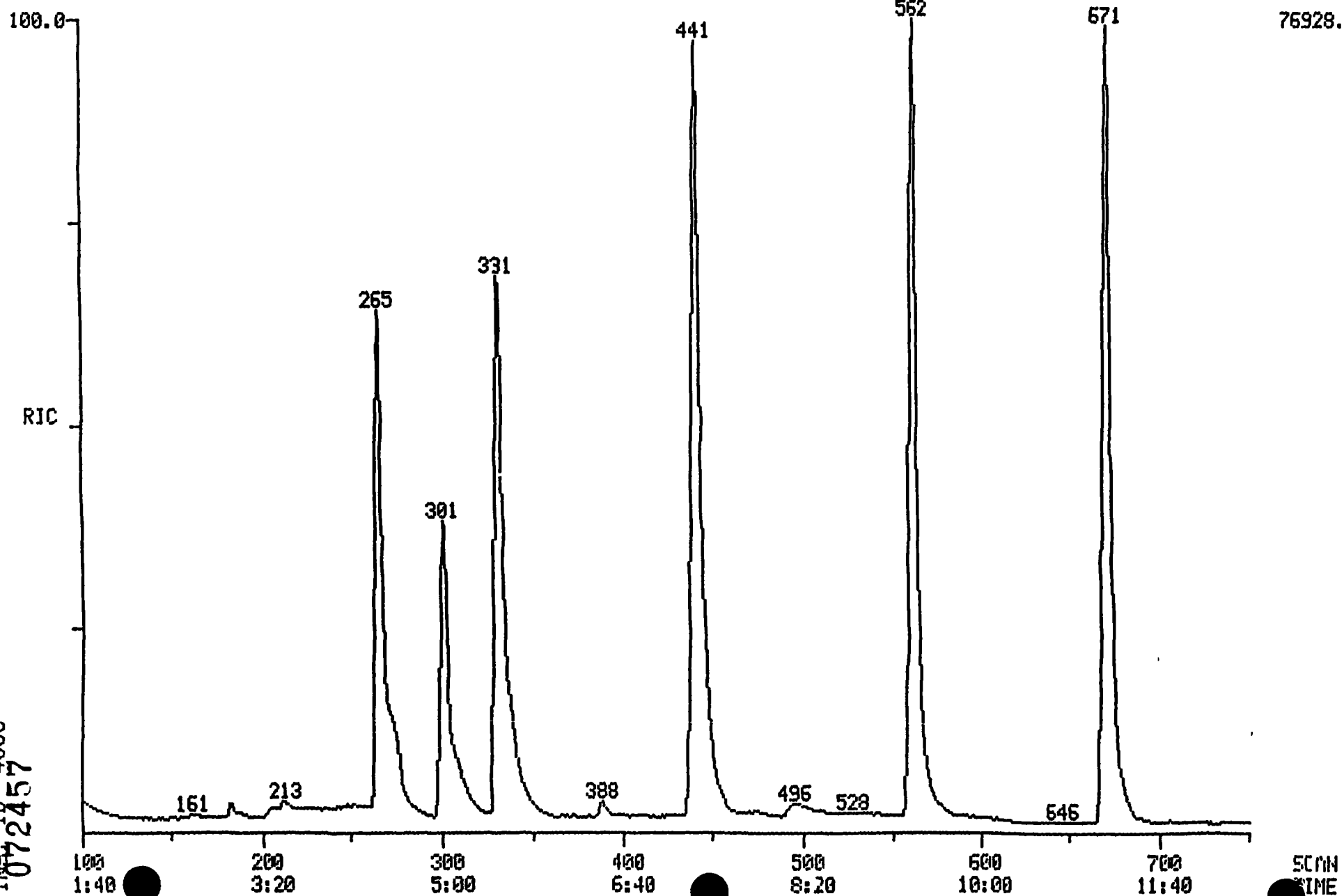
J = COMPOUND IS PRESENT, BUT BELOW THE LISTED DETECTION LIMIT

RIC
02/07/92 12:45:00
SAMPLE: UBLK
CONDS.: ----
RANGE: G 1,1000

DATA: EB0207U01 #1
CALI: EB0207U01 #3

SCANS 100 TO 750

LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3



072458

VOA QUANTITATION REPORT

SAMPLE ID.	VBLK		
ENAME	EB0207V01	INST	4000
CLIENT	FRENCH	ANALYST	PVG
DATE INJECTED	02/07/92 12:45:00	VERIFIED BY	TC
CALIB STD DATE	02/05/92	CORR. FACTOR	1.00

SCAN#	VOA COMPOUNDS	M/E	AMOUNT	RRT	AREA
265 CI01	BROMOCHLOROMETHANE	**IS1** 128	50 UG/L	1.000	24575
331 CI10	1,4-DIFLUOROBENZENE	**IS2** 114	50 UG/L	1.000	119864
562 CI20	D5-CHLOROBENZENE	**IS3** 117	50 UG/L	1.000	117539
301 CS15	D4-1,2-DICHLOROETHANE	**SU1** 65	113 %	1.136	54624
441 CS05	DB-TOLUENE	**SU2** 98	102 %	1.332	133867
671 CS10	P-BROMOFLUOROBENZENE	**SU3** 95	100 %	1.194	78993
161 C035	ACETONE	43	4 UG/L	0.608	1272

072459

ORGANICS ANALYSIS DATA SHEET -

LABORATORY NAME: KEYSTONE

CASE NO. ---

SAMPLE ID NO.: 910133102

GC REPORT NO. 01/27/92

SAMPLE MATRIX: SOIL

CONTRACT NO. ---

DATA RELEASE AUTHORIZED BY:  ...

DATE SAMPLE RECEIVED: 11/30/92

SEMIVOLATILES

CONCENTRATION: LOW

DATAFILE: 9U01331C02

DATE EXTRACTED: 11/31/92

DATE ANALYZED: 02/06/92

COMPOUND		DETECTION LIMIT (MILLIGRAMS / KG)	AMOUNT FOUND
C315	PHENOL	1000 U	
C325	BIS(2-CHLOROETHYL)ETHER	1000 U	
C330	2-CHLOROPHENOL	1000 U	
C335	1,3-DICHLOROBENZENE	1000 U	
C340	1,4-DICHLOROBENZENE	1000 U	
C345	BENZYL ALCOHOL	1000 U	
C350	1,2-DICHLOROBENZENE	1000 U	
C355	2-METHYLPHENOL	1000 U	
C357	2,2'-OXYBIS(1-CHLOROPROPANE)	1000 U	
C365	4-METHYLPHENOL	1000 U	
C370	N-NITROSODIPROPYLAMINE	1000 U	
C375	HEXACHLOROETHANE	1000 U	
C410	NITROBENZENE	1000 U	
C415	ISOPHORONE	1000 U	
C420	2-NITROPHENOL	1000 U	
C425	2,4-DIMETHYLPHENOL	1000 U	
C430	BENZOIC ACID	5000 U	
C435	BIS(2-CHLOROETHOXY)METHANE	1000 U	
C440	2,4-DICHLOROPHENOL	1000 U	
C445	1,2,4-TRICHLOROBENZENE	1000 U	
C450	NAPHTHALENE	1000	5100
C455	4-CHLOROANILINE	1000 U	
C460	HEXACHLOROBUTADIENE	1000 U	
C465	P-CHLORO-M-CRESOL	1000 U	
C470	2-METHYLNAPHTHALENE	1000	1500
C510	HEXACHLOROCYCLOPENTADIENE	1000 U	
C515	2,4,6-TRICHLOROPHENOL	1000 U	
C520	2,4,5-TRICHLOROPHENOL	5000 U	
C525	2-CHLORONAPHTHALENE	1000 U	
C530	2-NITROANILINE	5000 U	
C535	DIMETHYL PHTHALATE	1000 U	
C540	ACENAPHTHYLENE	1000	170 J
C545	3-NITROANILINE	5000 U	
C550	ACENAPHTHENE	1000	740 J
C555	2,4-DINITROPHENOL	5000 U	
C560	4-NITROPHENOL	5000 U	
C565	DIBENZOFURAN	1000	230 J
C570	2,4-DINITROTOLUENE	1000 U	
C543	2,6-DINITROTOLUENE	1000 U	

SAMPLE NUMBER: SPEC0001-01 SI-16

SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET, CONTINUED

DATAFILE: 9U01331C02

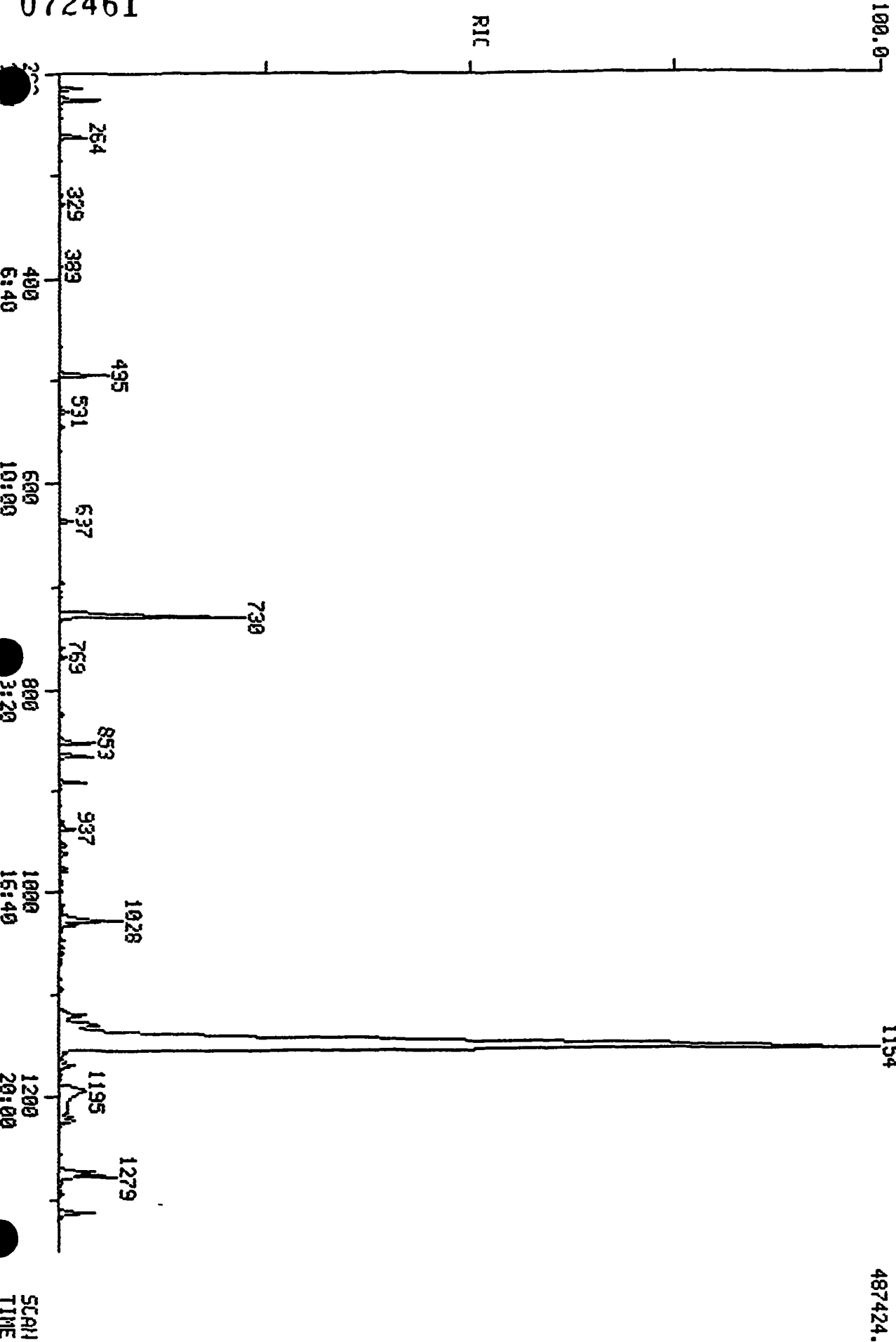
COMPOUND	DETECTION LIMIT (MILLIGRAMS / KG)	AMOUNT FOUND
C580 DIETHYL PHTHALATE	1000 U	
C585 4-CHLOROPHENYL PHENYL ETHER	1000 U	
C590 FLUORENE	1000	1400
C595 4-NITROANILINE	5000 U	
C610 4,6-DINITRO-2-METHYLPHENOL	5000 U	
C615 N-NITROSODIPHENYLAMINE	1000 U	
C625 4-BROMOPHENYL PHENYL ETHER	1000 U	
C630 HEXACHLOROBENZENE	1000 U	
C635 PENTACHLOROPHENOL	5000 U	
C640 PHENANTHRENE	1000	2700
C645 ANTHRACENE	1000 ..	250 J
C650 DI-N-BUTYL PHTHALATE	1000 U	
C655 FLUORANTHENE	1000	400 J
C715 PYRENE	1000	720 J
C720 BUTYL BENZYL PHTHALATE	1000 U	
C725 3,3'-DICHLOROBENZIDINE	2000 U	
C730 BENZO(A)ANTHRACENE	1000 U	
C745 BIS(2-ETHYLHEXYL)PHTHALATE	1000 U	
C740 CHRYSENE	1000 U	
C760 DI-N-OCTYL PHTHALATE	1000 U	
C765 BENZO(B)FLUORANTHENE	1000 U	
C770 BENZO(K)FLUORANTHENE	1000 U	
C775 BENZO(A)PYRENE	1000 U	
C780 INDENO(1,2,3-CD)PYRENE	1000 U	
C785 DIBENZO(A,H)ANTHRACENE	1000 U	
C790 BENZO(GHI)PERYLENE	1000 U	

U = UNDETECTED AT THE LISTED DETECTION LIMIT

J = COMPOUND IS PRESENT, BUT BELOW THE LISTED DETECTION LIMIT

072461

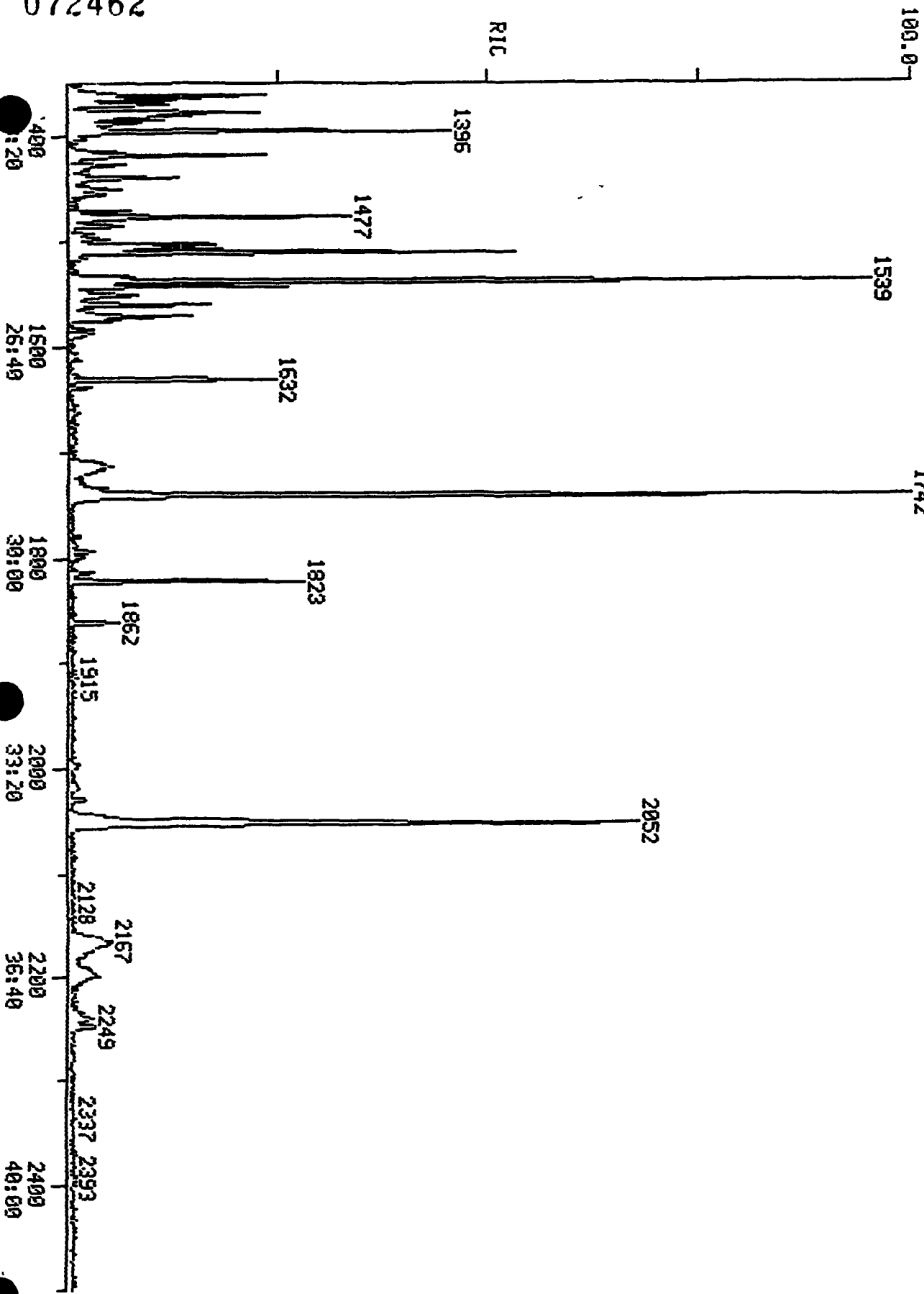
RIC
02/06/92 20:28:00
SAMPLE: SPEC0001-01 SI-16
COND5.: ---
RANGE: G 1,2500 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
DATA: 9U01331C02 #1
CALI: 9U01331C02 #3
SCANS 200 TO 1350



SCAN
TIME

072462

RIC
02/06/92 20:28:00
SAMPLE: SPEC0001-01 51-16
COND5: ---
RANGE: G 1,2500 LABEL: H 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
DATA: 9U01331C02 #1
CALI: 9U01331C02 #3
SCANS 1350 TO 2500



10928.

SCAN
TIME

SAMPLE ID
072483

SPEC0001-01 SI-16

FILENAME

9U01331C02

INST ID

4510

CLIENT

FRENCH

ANALYST

JDD

.E INJECTED

02/06/92 20:28 00

VERIFIED BY

JDD

CALIB STD DATE

01/27/92

CORR. FACTOR

100 00

SCAN#	SEMIVOLATILE COMPOUNDS		M/E	AMOUNT	RRT	AREA
495	CI30	1,4-DICHLOROBENZENE-D4 ** IS	152	2000 MG/KG	1.000	10729
727	CI40	NAPHTHALENE-D8 ** IS2 **	136	2000 MG/KG	1.000	46761
1028	CI50	ACENAPHTHENE-D10 ** IS3 **	164	2000 MG/KG	1.000	23665
1275	CI60	PHENANTHRENE-D10 ** IS4 **	188	2000 MG/KG	1.000	26162
1742	CI70	CHRYSENE-D12 ** IS5 **	240	2000 MG/KG	1.000	16098
2052	CI75	PERYLENE-D12 ** IS6 **	264	2000 MG/KG	1.000	13207
730	C450	NAPHTHALENE	128	5060 MG/KG	1.004	131380
853	C470	2-METHYLNAPHTHALENE	142	1504 MG/KG	1.173	24400
1000	C540	ACENAPHTHYLENE	152	169 MG/KG	0.973	3546
1032	C550	ACENAPHTHENE	153	741 MG/KG	1.004	9753
1061	C565	DIBENZOFURAN	168	227 MG/KG	1.032	4077
1121	C590	FLUORENE	166	1414 MG/KG	1.090	20034
1279	C640	PHENANTHRENE	178	2710 MG/KG	1.003	46050
1285	C645	ANTHRACENE	178	248 MG/KG	1.008	3527
1477	C655	FLUORANTHENE	202	404 MG/KG	1.158	5564
1511	C715	PYRENE	202	717 MG/KG	0.867	8492

072464

ORGANICS ANALYSIS DATA SHEET -

LABORATORY NAME: KEYSTONE

CASE NO.: ---

SAMPLE ID NO.: 91---

QC REPORT NO.: 01/27/92

SAMPLE MATRIX: SOIL

CONTRACT NO.: ---

DATA RELEASE AUTHORIZED BY: *Ray*

DATE SAMPLE RECEIVED: ...

SEMIVOLATILES

CONCENTRATION: LOW

DATAFILE: 9B0131C01W

DATE EXTRACTED: ... 1/31/92 ...

DATE ANALYZED: 02/07/92

COMPOUND		DETECTION LIMIT (MILLIGRAMS / KG)	AMOUNT FOUND
C315	PHENOL	100 U	
C325	BIS(2-CHLOROETHYL)ETHER	100 U	
C330	2-CHLOROPHENOL	100 U	
C335	1,3-DICHLOROBENZENE	100 U	
C340	1,4-DICHLOROBENZENE	100 U	
C345	BENZYL ALCOHOL	100 U	
C350	1,2-DICHLOROBENZENE	100 U	
C355	2-METHYLPHENOL	100 U	
C357	2,2'-OXYBIS(1-CHLOROPROPANE)	100 U	
C365	4-METHYLPHENOL	100 U	
C370	N-NITROSODIPROPYLAMINE	100 U	
C375	HEXACHLOROETHANE	100 U	
C410	NITROBENZENE	100 U	
C415	ISOPHORONE	100 U	
C420	2-NITROPHENOL	100 U	
C425	2,4-DIMETHYLPHENOL	100 U	
C430	BENZOIC ACID	500 U	
C435	BIS(2-CHLOROETHOXY)METHANE	100 U	
C440	2,4-DICHLOROPHENOL	100 U	
C445	1,2,4-TRICHLOROBENZENE	100 U	
C450	NAPHTHALENE	100 U	
C455	4-CHLOROANILINE	100 U	
C460	HEXACHLOROBUTADIENE	100 U	
C465	P-CHLORO-M-CRESOL	100 U	
C470	2-METHYLNAPHTHALENE	100 U	
C510	HEXACHLOROCYCLOPENTADIENE	100 U	
C515	2,4,6-TRICHLOROPHENOL	100 U	
C520	2,4,5-TRICHLOROPHENOL	500 U	
C525	2-CHLORONAPHTHALENE	100 U	
C530	2-NITROANILINE	500 U	
C535	DIMETHYL PHTHALATE	100 U	
C540	ACENAPHTHYLENE	100 U	
C545	3-NITROANILINE	500 U	
C550	ACENAPHTHENE	100 U	
C555	2,4-DINITROPHENOL	500 U	
C560	4-NITROPHENOL	500 U	
C565	DIBENZOFURAN	100 U	
C570	2,4-DINITROTOLUENE	100 U	
C543	2,6-DINITROTOLUENE	100 U	

SAMPLE NUMBER SBLK WD

VOLATILE ORGANICS ANALYSIS DATA SHEET, CONTINUED

DATAFILE: 9B0131C01W

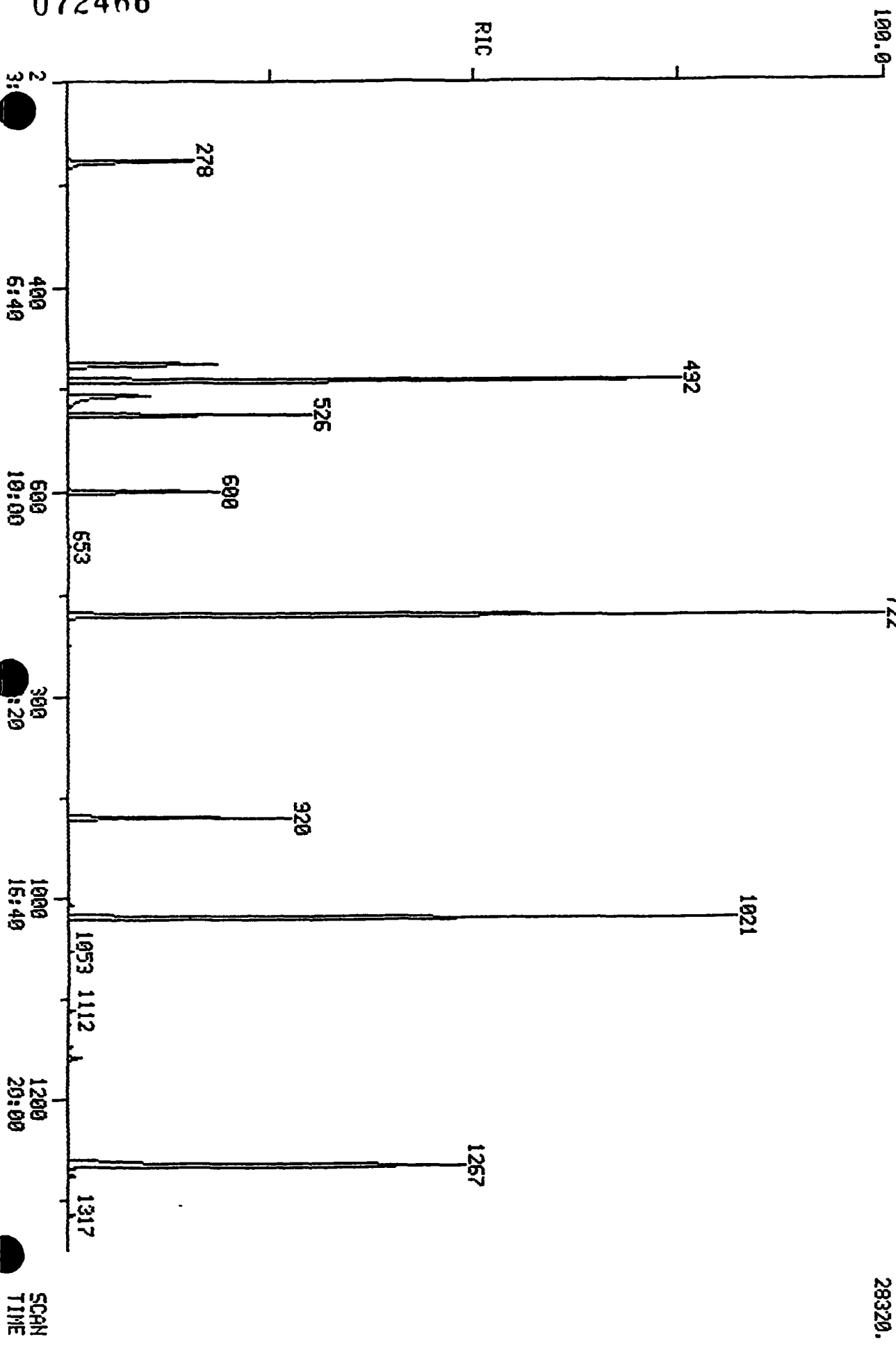
COMPOUND	DETECTION LIMIT (MILLIGRAMS / KG)	AMOUNT FOUND
C580 DIETHYL PHTHALATE	100 U	
C585 4-CHLOROPHENYL PHENYL ETHER	100 U	
C590 FLUORENE	100 U	
C595 4-NITROANILINE	500 U	
C610 4,6-DINITRO-2-METHYLPHENOL	500 U	
C615 N-NITROSODIPHENYLAMINE	100 U	
C625 4-BROMOPHENYL PHENYL ETHER	100 U	
C630 HEXACHLOROBENZENE	100 U	
C635 PENTACHLOROPHENOL	500 U	
C640 PHENANTHRENE	100 U	
C645 ANTHRACENE	100 U	
C650 DI-N-BUTYL PHTHALATE	100 U	
C655 FLUORANTHENE	100 U	
C715 PYRENE	100 U	
C720 BUTYL BENZYL PHTHALATE	100 U	
C725 3,3'-DICHLOROBENZIDINE	200 U	
C730 BENZO(A)ANTHRACENE	100 U	
C745 BIS(2-ETHYLHEXYL)PHTHALATE	100 U	
C740 CHRYSENE	100 U	
C760 DI-N-OCTYL PHTHALATE	100 U	
C765 BENZO(B)FLUORANTHENE	100 U	
C770 BENZO(K)FLUORANTHENE	100 U	
C775 BENZO(A)PYRENE	100 U	
C780 INDENO(1,2,3-CD)PYRENE	100 U	
C785 D(BENZO(A,H)ANTHRACENE	100 U	
C790 BENZO(GHI)PERYLENE	100 U	

U = UNDETECTED AT THE LISTED DETECTION LIMIT

J = COMPOUND IS PRESENT, BUT BELOW THE LISTED DETECTION LIMIT

072466

RIC
02/07/92 10:06:00
SAMPLE: SBK MD
COND: ---
RANGE: G 1,2400 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
DATA: 980131C01M #1
CALI: 980131C01M #3
SCANS 200 TO 1350



28320.

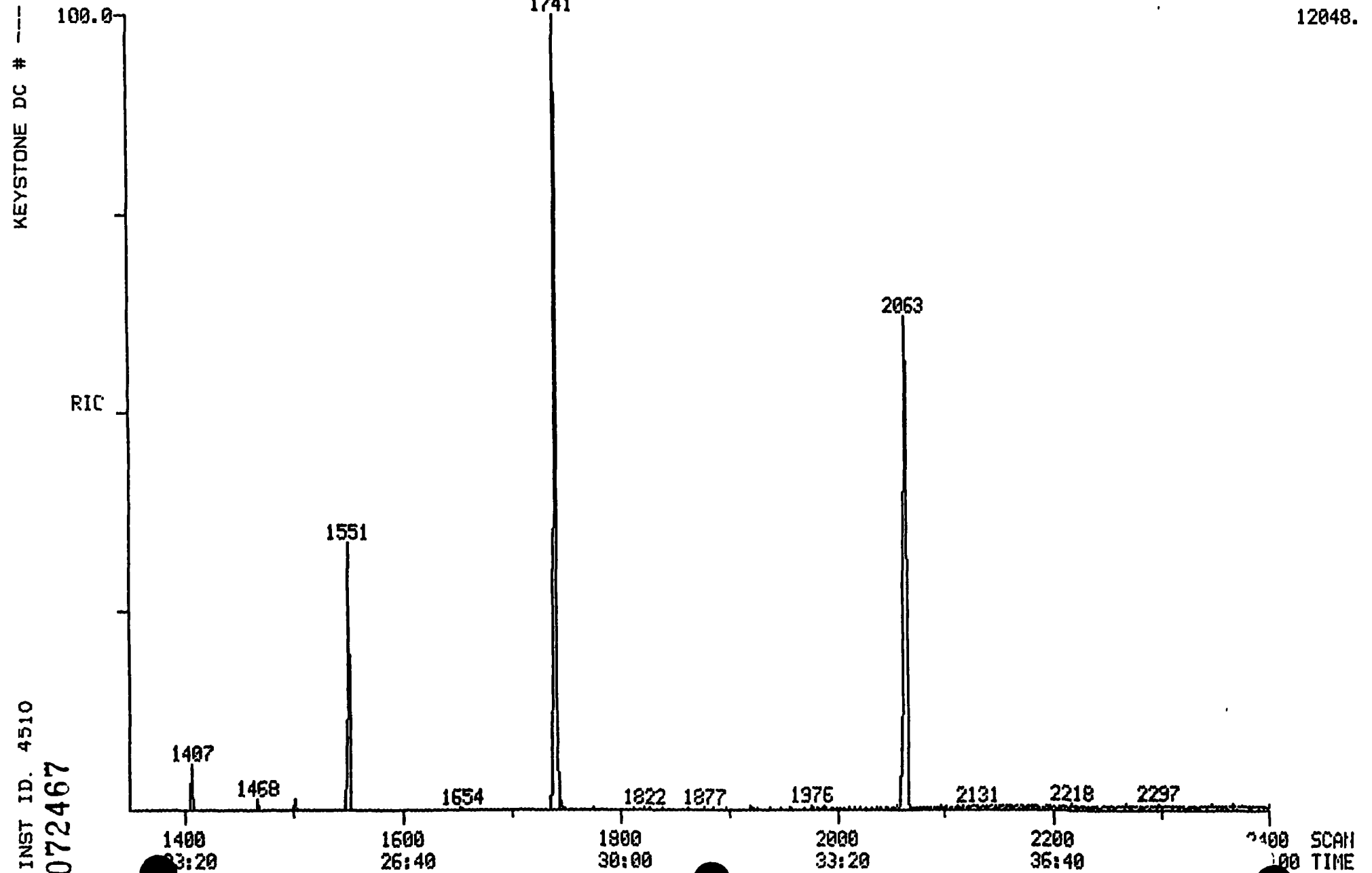
RIC
02/07/92 10:05:00
SAMPLE: SBLK WD
CONDS.: ---

DATA: 9B0131C01W #1
CALI: 9B0131C01W #3

SCANS 1350 TO 2400

RANGE: G 1,2400 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3

12048.



SAMPLE ID
072468

SBLK WD

FILENAME

9B0131C01W

INST ID

4510

CLIENT

KEYSTONE

ANALYST

JDD

INJECTED

02/07/92 10:06:00

VERIFIED BY

CALIB STD DATE

01/27/92

CORR. FACTOR

10.00

SCAN#	SEMIVOLATILE COMPOUNDS		M/E	AMOUNT	RRT	AREA
492	CI30	1,4-DICHLOROBENZENE-D4 ** IS	152	200 MG/KG	1.000	9358
722	CI40	NAPHTHALENE-D8 ** IS2 **	136	200 MG/KG	1.000	37050
1021	CI50	ACENAPHTHENE-D10 ** IS3 **	164	200 MG/KG	1.000	16602
1267	CI60	PHENANTHRENE-D10 ** IS4 **	188	200 MG/KG	1.000	19525
1741	CI70	CHRYSENE-D12 ** IS5 **	240	200 MG/KG	1.000	14648
2063	CI75	PERYLENE-D12 ** IS6 **	264	200 MG/KG	1.000	12206
278	CS50	2-FLUOROPHENOL ** SU1 **	112	75 15 %	0.565	6728
507	CS45	PHENOL-D5 ** SU2 **	99	65 13 %	1.030	8795
1160	CS55	2,4,6-TRIBROMOPHENOL ** SU5	330	40 8 %	1.136	200
476	CS70	2-CHLOROPHENOL-D4 ** SU7 **	132	70 14 %	0.967	8324
526	CS75	1,2-DICHLOROBENZENE-D4 ** SU	150	80 16 %	1.069	5325
600	CS20	NITROBENZENE-D5 ** SU3 **	82	85 17 %	0.831	5234
920	CS25	2-FLUOROBIPHENYL ** SU4 **	172	95 19 %	0.901	8755
1551	CS30	TERPHENYL-D14 ** SU6 **	244	70 14 %	0.891	5517

072469

Analysis Request and Chain Custody Record

No.: 86
Page 1 of 2

FRENCH LTD. PROJECT				REPORTING LABORATORY		
FLTG, Incorporated 15010 FM 2100, Suite 200 Crosby, Texas 77532 (713) 328-5860 FAX (713) 328-2996				Name: Keystone Lab-Houston Address: 8300 Westpark Houston, TX 77063 Contact: Daniel D. Pastalaniec Phone: (713) 266-6800 FAX: (713) 974-5494		
DATA PACKAGE TO: FLTG, Incorporated Crosby, TX 77532 1024 Gulf Pump Road				Requested By: TD Standard TA: n Days: 7 ** Notify Lab Contact Immediately ** Notified by: Date:		
FLTG MATRIX CODE: SPEC FLTG SET NUMBER: SPEC0001 Quality Control Level: I Site Location: 1024 Gulf Pump Road Crosby, TX 77532						
FLTG Sample No	Date	Time	Location	Grab/ Comp	Matrix	Type
SPEC0001-01	1/30/92	08:45	SI-16	Grab	Water	ENV
<i>Ship in separate container</i>						
SAMPLER'S Name(s) (PRINT) 1. ROBERT OLIVER 2. 3.				Affiliation Operator GAF		
Carrier:				Bill No.:		
RELINQUISHED BY (SIGN) (INITIALS) Date Time 1. Robert Oliver R.O. 1-30-92 3:27 2.				RECEIVED BY (SIGN) (INITIALS) Date Time M.B. 1/30/92 3:27		
RETURNED BY (SIGN) (INITIALS) Date Time 1. 2.				DISPOSED BY (SIGN) (INITIALS) Date Time		
NOTES TO LAB: Sample to be analyzed per DAF						

(1-Original, 2-Set Data Package, 3-FLTG, 4-Sampler)

Analysis Request and Chain Custody Record

No.: 86
Page 2 of 2FLTG MATRIX CODE:SPEC
LTG SET NUMBER:SPEC0001

Lab Work Order No:

SAMPLING SOP REFERENCE:

DESCRIPTION:Groundwater

NOTES TO SAMPLER:

PARAMETERS REQUESTED

VOA

SVOA

TOX

TPH

FLTG Sample No	Lab Sample ID	Container	Preservative
SPEC0001-01		2-4 oz bottle	refrig

COMMENTS

Set QC Completed by:
(SIGN) (INITIALS)

Date

(1-Original,2-Set Data Package,3-FLTG,4-Sampler)

BOOKMARK

072471

Appendix 2

**Analytical Reports
INT-11 DNAPL sample**

01502434

Report
Prepared
for

F L T G , I N C .

1024 GULF PUMP ROAD.
CROSBY TX 77532

Attention : TED DAVIS

by

Keystone Lab - Houston
A Division of CHESTER LabNet
8300 Westpark Drive
Houston, Texas 77063
(713) 266-6800

CERTIFIED BY : *Dan Pastalaniec*

Dan Pastalaniec
Project Manager

PROJECT ID :
P.O. NUMBER : SPEC0015

2-6-22-92 *[Signature]*
WORK ORDER : H92-04.108
DATE RECEIVED : 9-APR-1992

SAMPLE & ANALYSIS SUMMARY

Keystone Sample ID	Client's Sample Number	Date/Time Collected	Sample Matrix
H92-04.108-001	LAB BLANK		WATER
H92-04.108-002	SPEC0015-01	04/08/92 14:40	WATER
H92-04.108-003	SPEC0015-01DUP	04/08/92 14:40	WATER
H92-04.108-004	SPEC0015-01MS	04/08/92 14:40	WATER

Date Submitted: 06/18/92 FLTG Set Number: SPEC0015
 Date Received: 04/09/92 10:35 Lab Number: H92-04.108

II.A Extraction Report

Parameter:SV\$TCL

Client

Sample ID | Analyst | Date-Time

 NONE

II.B Extraction Report

Parameter:PCB

Client

Sample ID | Analyst | Date-Time

 NONE

III. Spike Level Multipliers

Parameter	Client		Client	
	Sample ID	Multiplier	Sample ID	Multiplier
TOC	-01	10	-11	
TOX	-01	10000	-11	
VOA\$TCL	-01	0	-11	

IV. MOISTURE CONTENT

Client Sample ID | Wt. %

 NONE

COMMENTS:

SET NARRATIVE
Matrix SPEC

Keystone Lab-Houston
Lab Work Order:H92-04.108
Report Submission Date: 06/18/92

FLTG
Project Set Number:SPEC0015

I. SAMPLE COLLECTION/SHIPPING PROBLEMS

FLTG Sample No. Param.	Lab Sample No.	Problem	Outcome
NONE			

II. ANALYSIS PROBLEMS

FLTG Sample No. Param.	Lab Sample No.	Problem	Outcome
NONE			

III. QUALITY ASSURANCE PROBLEMS

FLTG Sample No.	File No.	Problem	Outcome
SPEC0015-01	4U04108V02	SU 1 Not Found ;SU 2 >110%	Matrix Effect
SPEC0015-01	4U04108V02	SU 1 >620%	Matrix Effect

COMMENTS- MS/MSD on VOA not done because of Matrix. Sample was run once within holding time but the data was worthless due to the high contamination. The three submitted runs were one day after the hold time expired.

17-JUN-1992

Page 1

Summary of Analytical Results

Date received: 9-APR-1992 Customer: FLITG, INC. Job name: H92-04.108

	Samples			
Keystone ID	108-001	108-002	108-003	108-004
Sampling Point	QA QC	X	QA QC	QA QC
Date Sampled	8-APR-1992	8-APR-1992	8-APR-1992	8-APR-1992
Customer ID	IAB BLANK	SPEC0015-01 NA	SPEC0015-01 DUP	SPEC0015-01 MS

Parameters	Units
------------	-------

Total Organic Carbon	mg/L	<1.0	506	556	97.0*
Analyst: RNS					
Date/Time: 04/13/92 10:31					
Dilution: 10					

Total Organic Halogens	mg/L	<0.005	595	599	103*
Analyst: DH					
Date/Time: 04/14/92 14:00					
Dilution: 10000					

* - % Recovery

NR - Not Required

NA - Not Applicable

VST ID: 4000
072476

SAMPLE NUMBER: SPEC0015-01 INT 11 1

ORGANICS ANALYSIS DATA SHEET

LABORATORY NAME: KEYSTONE ENV.
AB SAMPLE ID NO.: 910410802
AMPLE MATRIX: WATER
ATA RELEASE AUTHORIZED BY:.....

CASE NO.: ----
INITIAL CALIBRATION DATE: 04/22/92
CONTRACT NO.: --
DATE SAMPLE RECEIVED: 04/09/92

VOLATILES

CONCENTRATION: LOW
DATE ANALYZED: 04/23/92

DATAFILE: 4U04108V02B
DILUTION FACTOR: 10000.00

COMPOUND		DETECTION LIMIT (MICROGRAMS / LITER)	AMOUNT FOUND
C010	CHLOROMETHANE	100000 U	
C015	BROMOMETHANE	100000 U	
C020	VINYL CHLORIDE	100000 U	
C025	CHLOROETHANE	100000 U	
C030	METHYLENE CHLORIDE	50000	20000 J
C035	ACETONE	100000 U	
C040	CARBON DISULFIDE	50000 U	
C045	1,1-DICHLOROETHENE	50000 U	
C050	1,1-DICHLOROETHANE	50000	20000 J
C053	1,2-DICHLOROETHENE (TOTAL)	50000	21000 J
C060	CHLOROFORM	50000	810000
C065	1,2-DICHLOROETHANE	50000	650000
C110	2-BUTANONE	100000	23000 J
C115	1,1,1-TRICHLOROETHANE	50000 U	
C120	CARBON TETRACHLORIDE	50000	31000 J
C125	VINYL ACETATE	100000	150000
C130	BROMODICHLOROMETHANE	50000 U	
C140	1,2-DICHLOROPROPANE	50000 U	
C143	CIS-1,3-DICHLOROPROPENE	50000 U	
C150	TRICHLOROETHENE	50000 U	
C155	DIBROMOCHLOROMETHANE	50000 U	
C160	1,1,2-TRICHLOROETHANE	50000 U	
C165	BENZENE	50000	4400 J
C172	TRANS-1,3-DICHLOROPROPENE	50000 U	
C180	BROMOFORM	50000 U	
C205	4-METHYL-2-PENTANONE	100000	27000 J
C210	2-HEXANONE	100000 U	
C220	TETRACHLOROETHENE	50000	18000 J
C225	1,1,2,2-TETRACHLOROETHANE	50000	19000 J
C230	TOLUENE	50000 U	
C235	CHLOROBENZENE	50000 U	
C240	ETHYLBENZENE	50000 U	
C245	STYRENE	50000 U	
C250	XYLENES (TOTAL)	50000 U	

U = UNDETECTED AT THE LISTED DETECTION LIMIT

J = COMPOUND IS PRESENT, BUT BELOW THE LISTED DETECTION LIMIT

SAMPLE NUMBER: SPEC0015-01 I

ORGANICS ANALYSIS DATA SHEET - PAGE 4

LABORATORY NAME: KEYSTONE ENVIRONMENTAL RESOURCES, INC.

CASE NO.: ----

QC REPORT NO.:

ANALYST: PVG

DATAFILE: 4U04108V02

B. TENTATIVELY IDENTIFIED COMPOUNDS

CAS #	VOLATILE COMPOUND NAMES	SCAN#	PURITY	AMOUNT
				UG/L
	UNKNOWN	184		250000

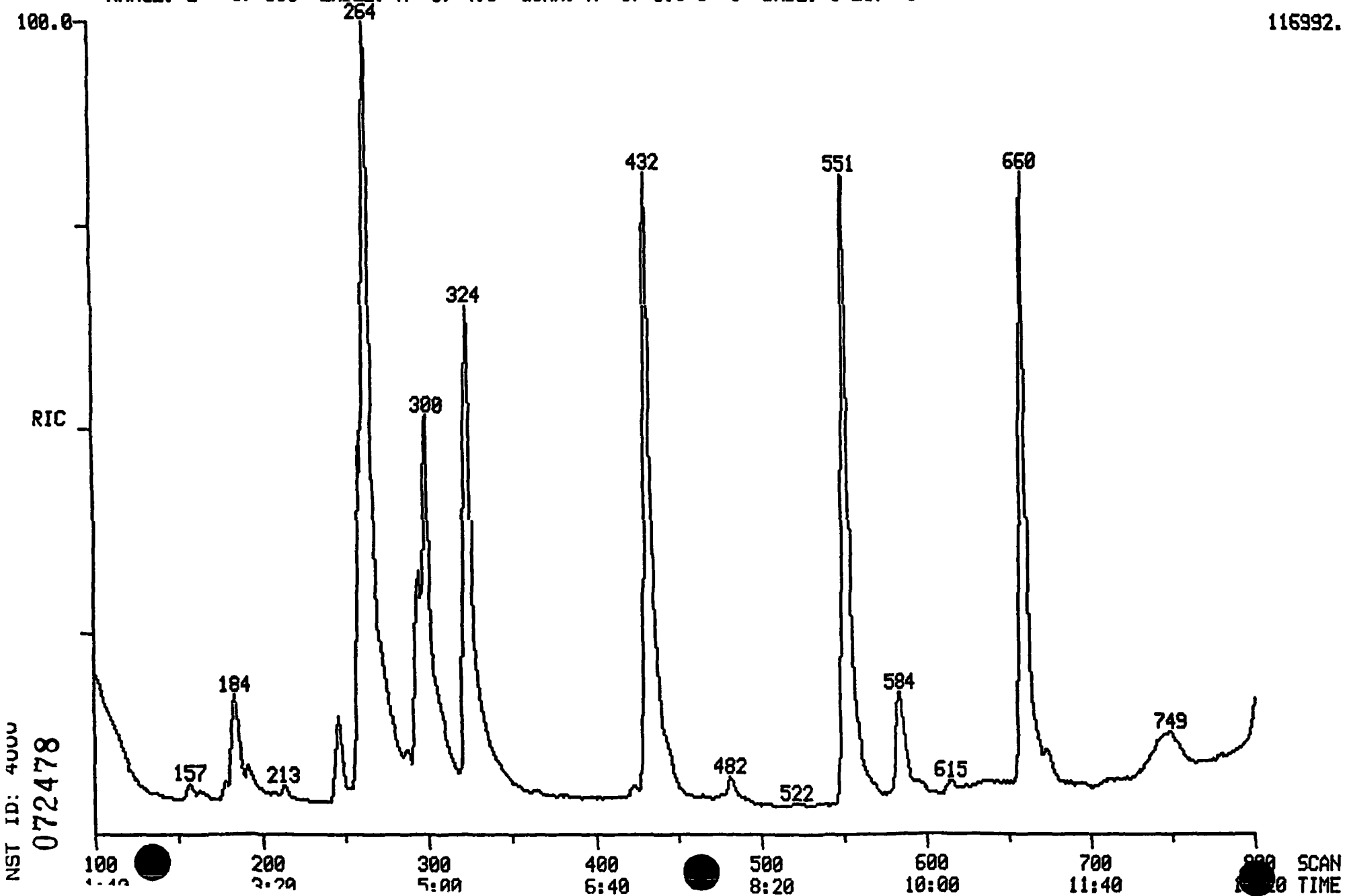
J = ESTIMATED VALUE - A 1:1 RESPONSE FACTOR IS ASSUMED

RIC
04/23/92 12:38:00
SAMPLE: SPEC0015-01 INT 11 1600
CONDS.: 04/09/92
RANGE: G 1, 800 LABEL: N 0, 4.0

DATA: 4U04108U02B #1
CALI: 4U04108U02B #3
SCANS 100 TO 800

QUAN: A 0, 1.0 J 0 BASE: U 20, 3

116992.



FRENCH LTD. PROJECT			REPORTING LABORATORY			
FLTG, Incorporated 5010 FM 2100, Suite 200 Crosby, Texas 77532 (713) 328-5860 FAX (713) 328-2996			Name: Keystone Lab-Houston Address: 8300 Westpark Houston, TX 77063 Contact: Daniel D. Pastalaniec Phone: (713) 266-6800 FAX: (713) 974-5491			
DATA PACKAGE TO: FLTG, Incorporated Crosby, TX 77532 1024 Gulf Pump Road			Requested By: TD Standard TA: Y Days: 21 Notified by: Date:			
FLTG MATRIX CODE: SPEC FLTG SET NUMBER: SPEC0015 Quality Control Level: I Site Location: 1024 Gulf Pump Road Crosby, TX 77532						
FLTG Sample No	Date	Time	Location	Grab/ Comp	Matrix	Type
SPEC0015-01	4/08/92	1440 7500	INT 11	Grab	Water	ENV
SAMPLER'S Name(s) (PRINT) 1. Jeffrey A Barber 2. 3.			Affiliation Operator G & F Technical Services			
Carrier:			Bill No.:			
RELINQUISHED BY (SIGN) (INITIALS) Date Time 1. Jeffrey A Barber 4/9/92 10:35 2.			RECEIVED BY (SIGN) (INITIALS) Date Time 207mm 4/9/92 10:35			
RETURNED BY (SIGN) (INITIALS) Date Time 1. 2.			DISPOSED BY (SIGN) (INITIALS) Date Time			
NOTES TO LAB:						

FLTG MATRIX CODE:SPEC
FLTG SET NUMBER:SPEC0015

Lab Work Order No:

SAMPLING SOP REFERENCE:Water

DESCRIPTION:Water

NOTES TO SAMPLER:

PARAMETERS REQUESTED

TOC

TOX

VOA\$TCL

FLTG Sample No	Lab Sample ID	Container	Preservative
SPEC0015-01 SPEC0015-01 SPEC0015-01	----- ----- -----	2-40ml VOA 4 oz glass (z) 8 oz glass (i)	HCL H2SO4 HCL

COMMENTS

Set QC Completed by:
(SIGN) (INITIALS)

Date

(White - Original, Yellow - Set Data Package, Pink - FLTG, Orange - Sampler)

BOOKMARK

072481

Appendix 3

**Cone Penetrometer Logs
S1-16 Area**

01502435

FUGRO GEOSCIENCES, INC.

6105 Rookin
Houston, Texas 77074
Tel. (713) 778-5580
Fax (713) 778-5501

May 18, 1992
Report Number 0301-2126

FLTG, Incorporated
15010 FM 2100, Suite 200
Crosby, Texas 77532

Attention: Mr Mike Day / Mr Bill Edmondson

**CONE PENETROMETER TESTING
AND RELATED SERVICES
FOR AFFECTED GROUNDWATER DELINEATION
FRENCH LIMITED SITE
CROSBY, TEXAS**

Gentlemen

Please find enclosed herewith the final results of the cone penetrometer tests conducted at the above referenced location

For your information, the soil stratigraphy was identified using Campanella and Robertson's Simplified Soil Behavior Chart. Please note that because of the empirical nature of the soil behavior chart, the soil identification should be verified locally.









Fugro Geosciences appreciates the opportunity to be of service to your organization. If you should have any questions, or if we can be of further assistance, please do not hesitate to contact us. We look forward to working with you in the future.

Very truly yours,
FUGRO GEOSCIENCES, INC.

L. David Parker, P.E.
CPT Department Manager

LDP/kjp

Key To Soil Classification and Symbols

SOIL TYPE (Shown in Symbol Column)				SAMPLE TYPE (Shown in Samples Column)			
	Sand	Silt	Clay				
							
Fill	Sandy	Silty	Clayey	Undisturbed	Rock Core	Split Spoon	No Recovery
Predominant Type Shown Heavy							

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (Major portion Retained on No 200 Sieve)

Includes (1) clean gravels and sand described as fine, medium or coarse, depending on distribution of grain sizes (2) silty or clayey gravels and sands and (3) fine grained low plasticity soils ($PI < 10$) such as sandy silts. Condition is rated according to relative density, as determined by lab tests or estimated from resistance to sampler penetration.

Descriptive Term	Penetration Resistance*	Relative Density
Loose	0 - 10	0 to 40%
Medium Dense	10 - 30	40 to 70%
Dense	30 - 50	70 to 90%
Very Dense	Over 50	90 to 100%

* Blows/Foot, 140# Hammer, 30" Drop

FINE GRAINED SOILS (Major Portion Passing No 200 Sieve)

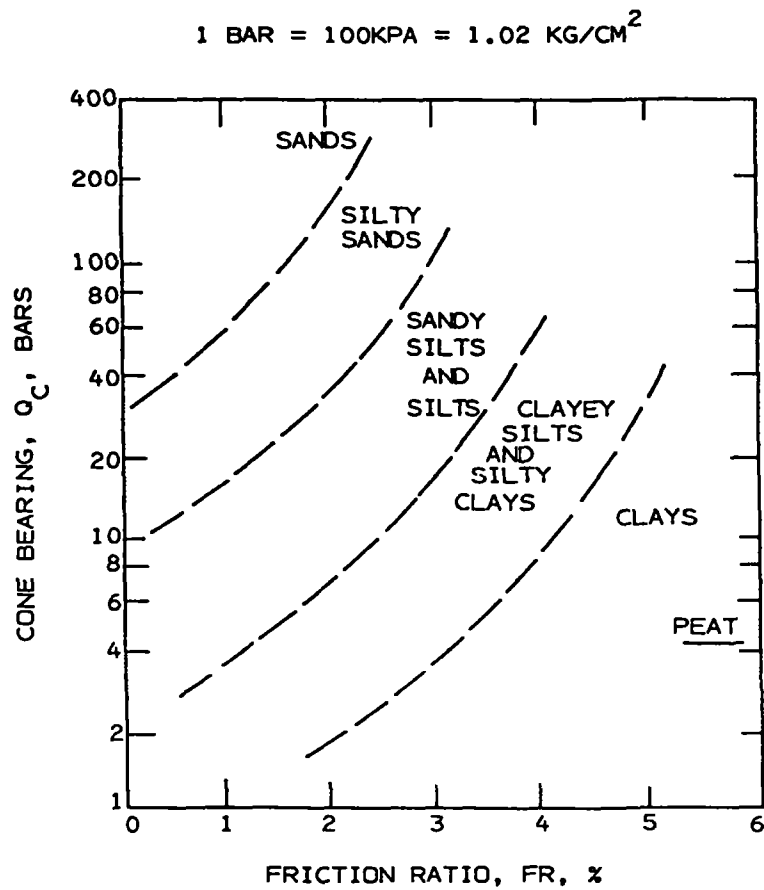
Includes (1) inorganic and organic silts and clays, (2) sandy, gravelly or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings or by unconfined compression tests for soils with $PI \geq 10$.

Descriptive Term	Cohesive Shear Strength Tons/Square Foot
Very Soft	Less Than 0.125
Soft	0.125 to 0.25
Firm	0.25 to 0.50
Stiff	0.50 to 1.00
Very Stiff	1.00 to 2.00
Hard	2.00 and Higher

Note: Slickensided and fissured clay may have lower unconfined compressive strengths than shown above because of planes of weakness or shrinkage cracks, consistency ratings of such soils are based on hand penetrometer readings.

TERMS CHARACTERIZING SOIL STRUCTURE

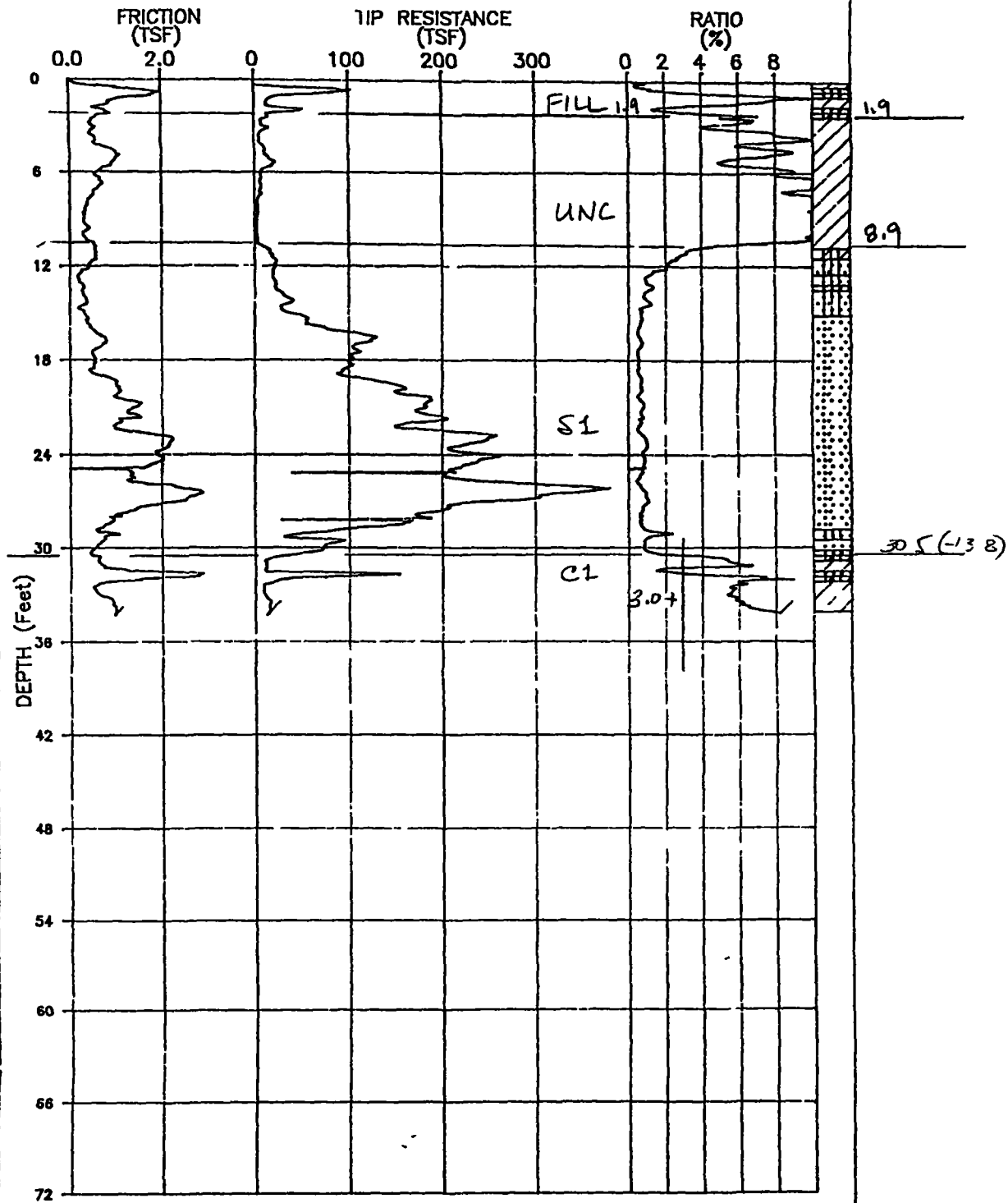
Parting	paper thin in size	Flocculated	pertaining to cohesive soils that exhibit a loose knit or flakey structure
Seam	1/8" to 3" thick	Slickensided	having inclined planes of weakness that are slick and glossy in appearance
Layer	greater than 3"		
Fissured	containing shrinkage cracks, frequently filled with fine sand or silt, usually more or less vertical		
Sensitive	pertaining to cohesive soils that are subject to appreciable loss of strength when remolded	<u>Degree of Slickensided Development</u>	
Interbedded	composed of alternate layers of different soil types	Slightly Slickensided	slickensides present at intervals of 1' to 2', soil does not easily break along these planes
Laminated	composed of thin layers of varying color and texture	Moderately Slickensided	slickensides spaced at intervals of 1' to 2', soil breaks easily along these planes
Calcareous	containing appreciable quantities of calcium carbonate	Extremely Slickensided.	continuous and interconnected slickensides spaced at intervals of 4" to 12', soil breaks along the slickensides into pieces 3" to 6" in size
Well Graded	having wide range in grain sizes and substantial amounts of all intermediate particle sizes		
Poorly Graded	predominantly of one grain size, or having a range of sizes with some intermediate size missing	Intensely Slickensided	slickensides spaced at intervals of less than 4", continuous in all directions, soil breaks down along planes into nodules 1/4" to 2" in size



CAMPANELLA AND ROBERTSON CLASSIFICATION CHART

072485

ELEV = 16 69 700



JOB NUMBER : 91-1118

CPT NUMBER : SI-18 N3289 E3911

DATE : 08-12-1991

ELEVATION : 0.00

CONE NUMBER: F5CKEV600

PUMP SCIENCES, INC

072486

WELL CONSTRUCTION LOG FRENCH, LTD. SUPERFUND SITE		CONTRACTOR: LAYNE ENVIRONMENTAL SERVICES		BECHTEL JOB NUMBER: 21454-100	WELL NUMBER: S1-16
GEOLOGIST: M.A. GAGE	DATE BEGUN: 7-9-91	DATE COMPLETED: 7-9-91	COORDINATES:	PAGE 1 OF 1	

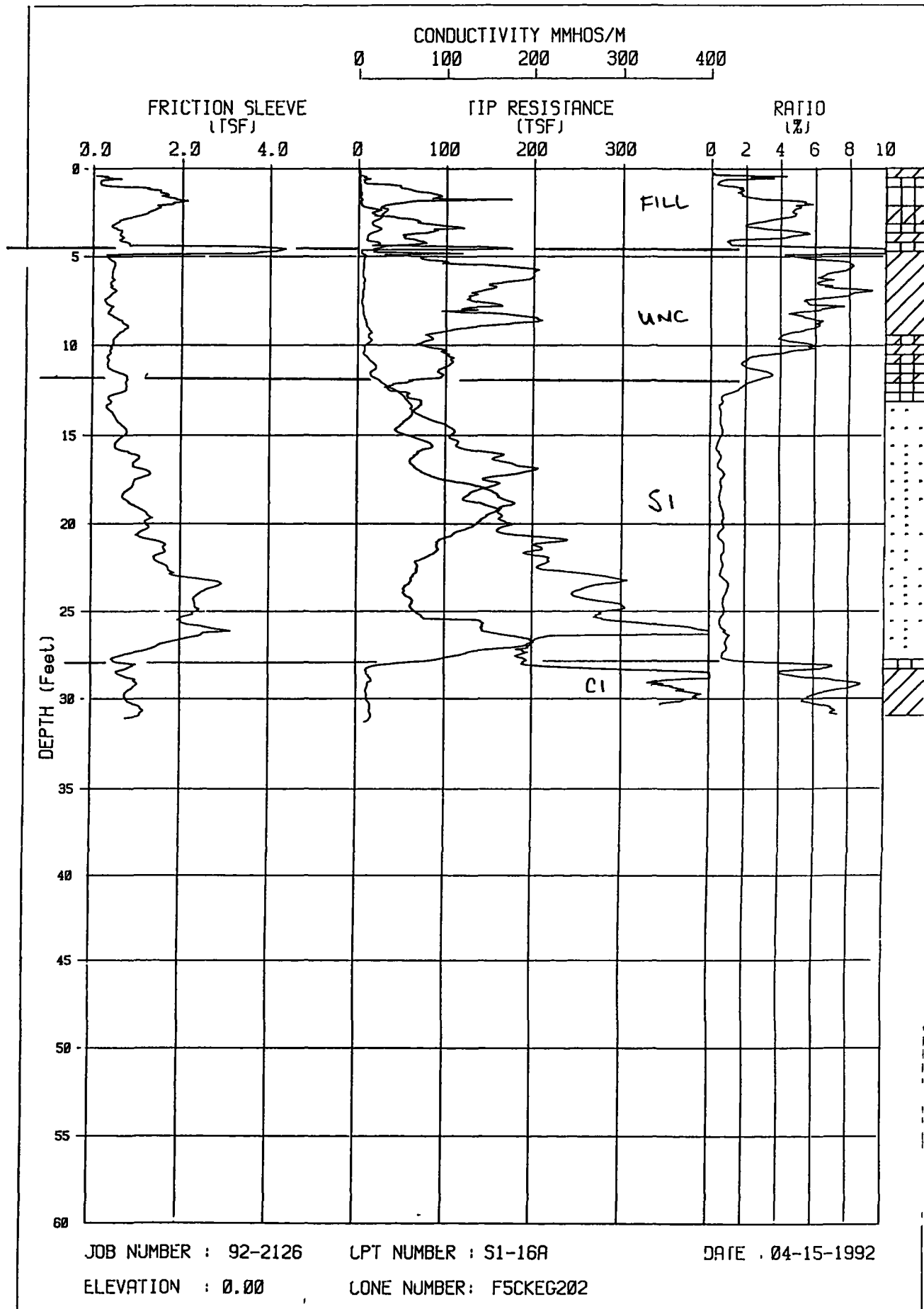
GROUND SURFACE
ELEVATION: _____

GEOLOGIC LOG	DEPTH (FT)	12" DIA. BORING	DEPTH FROM TOP GROUND (FEET)
FILL, 0-1' gravel	0	TOP OF GROUND	
1-9' sandy clay, med to dk gry, rubber like debris @ 5-7'	9	BENTONITE-CEMENT GROUT	
SAND, little clay, lt to med gry, fn to med, OVM rdg 0ppm	15	TOP OF BENTONITE POLYMER GROUT	10
SAND, gry, fine to coarse, loose OVM rdg 0ppm	15	BENTONITE POLYMER GROUT	
	19	6" DIA. PVC, FLUSH JOINT, SCHEDULE 80 RISER PIPE	
	19	TOP OF BENTONITE PELLET SEAL	19
	21	BENTONITE PELLET SEAL	
	21	TOP OF FILTER PACK	21
	23	TOP OF SCREEN	23
	33	6" DIA. TYPE 304 STAINLESS STEEL SCREEN: 0.020" SLOT	
v coarse @ 30'		FILTER PACK SILICA SAND 16-40 SIEVE	
OVM rdg 5ppm @ 32'		BOTTOM OF SCREEN	33
CLAY, lt reddish brn, soft, some gravel	33	BENTONITE PELLET SEAL	
	35	2', 6" DIA. PVC SCHEDULE 80 SUMP	
		BOTTOM OF WELL	35

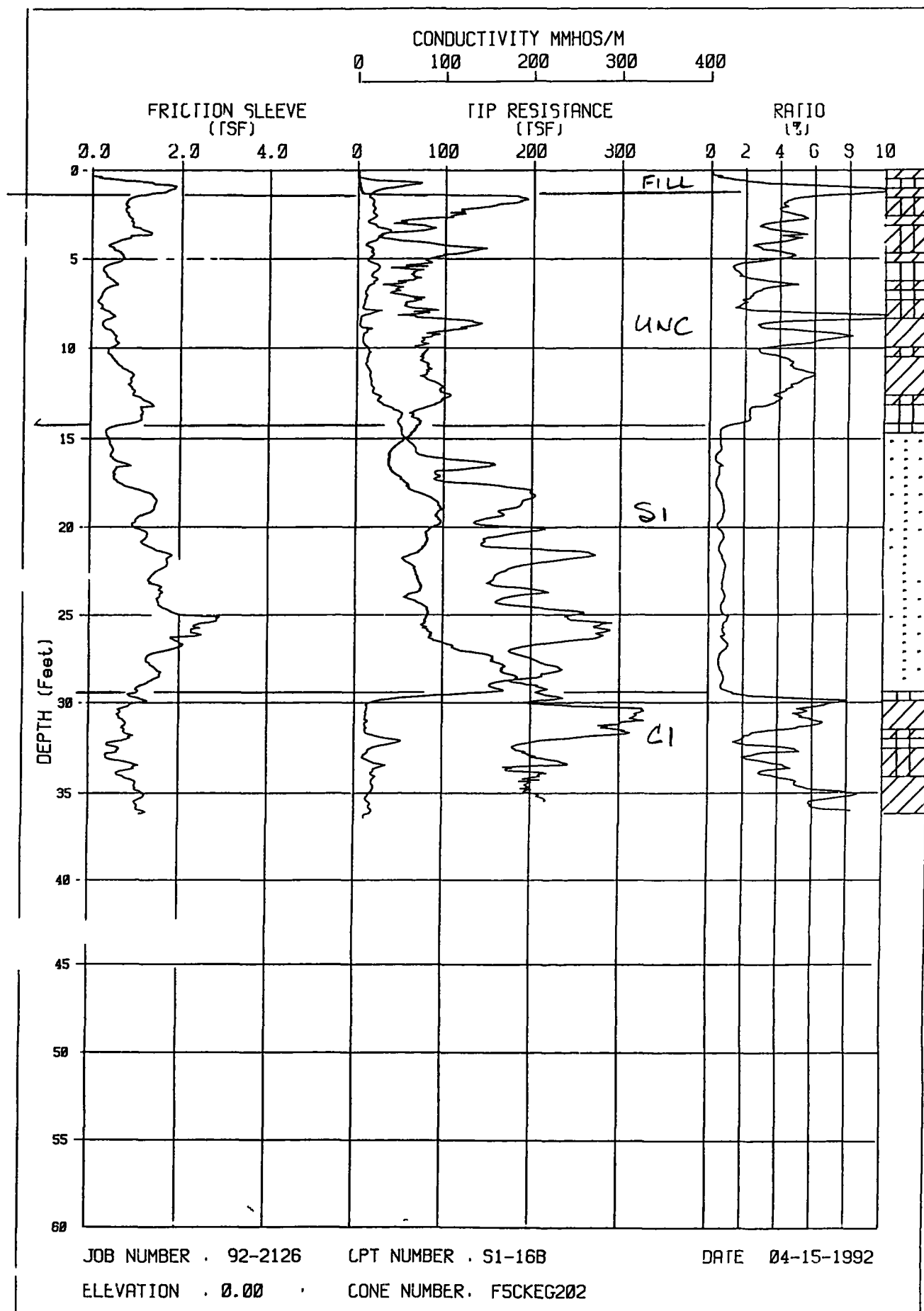
NO SCALE (NOTE DEPTH TO BOTTOM OF BORING IF DIFFERENT THAN BOTTOM OF WELL:)

DRILLING AND SAMPLING NOTES:	SAMPLING	
OVM READINGS: 0 ppm @ 10' & 15', 5 ppm @ 32'	SAMPLE NO.	INTERVAL (FEET)

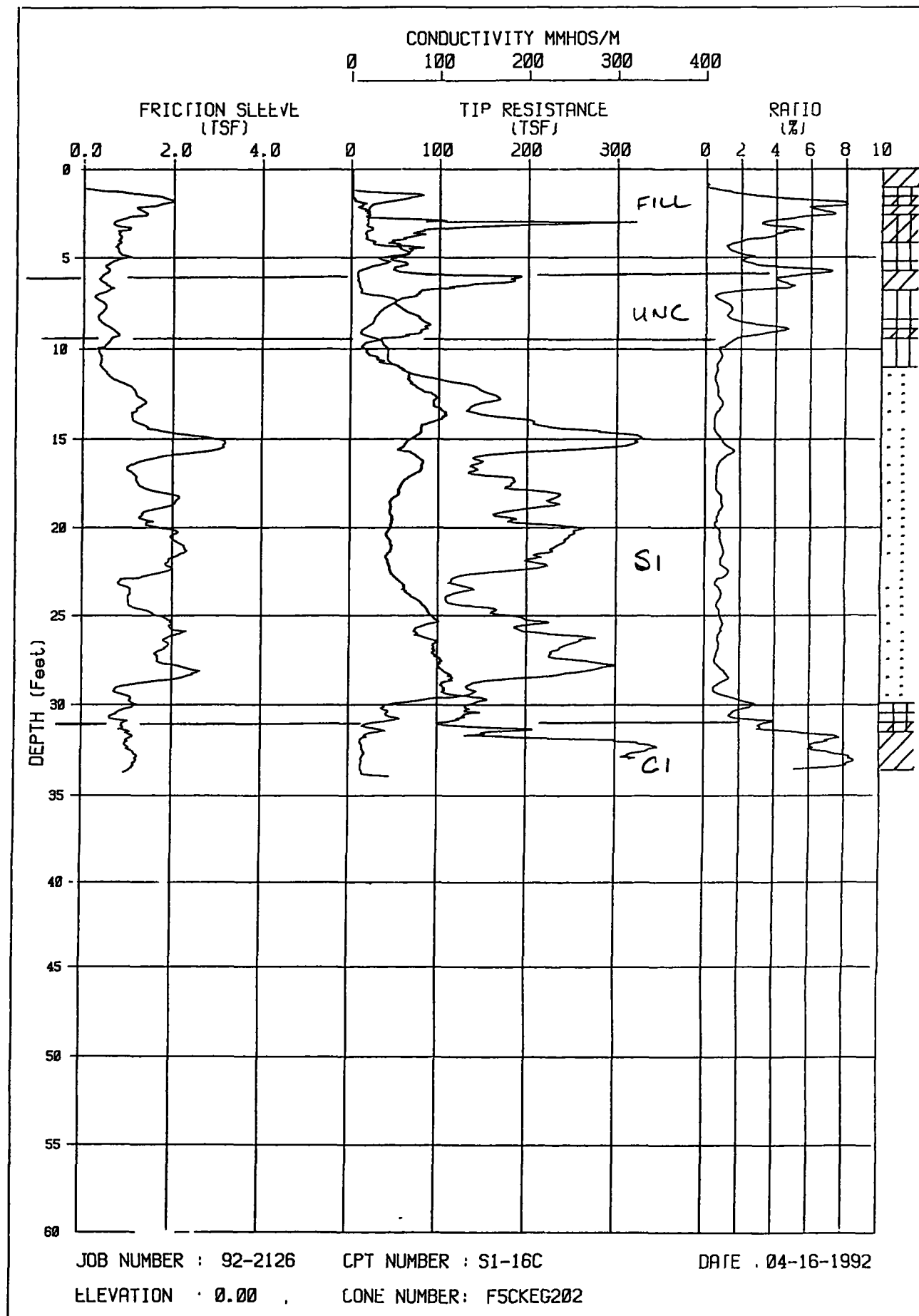
072487



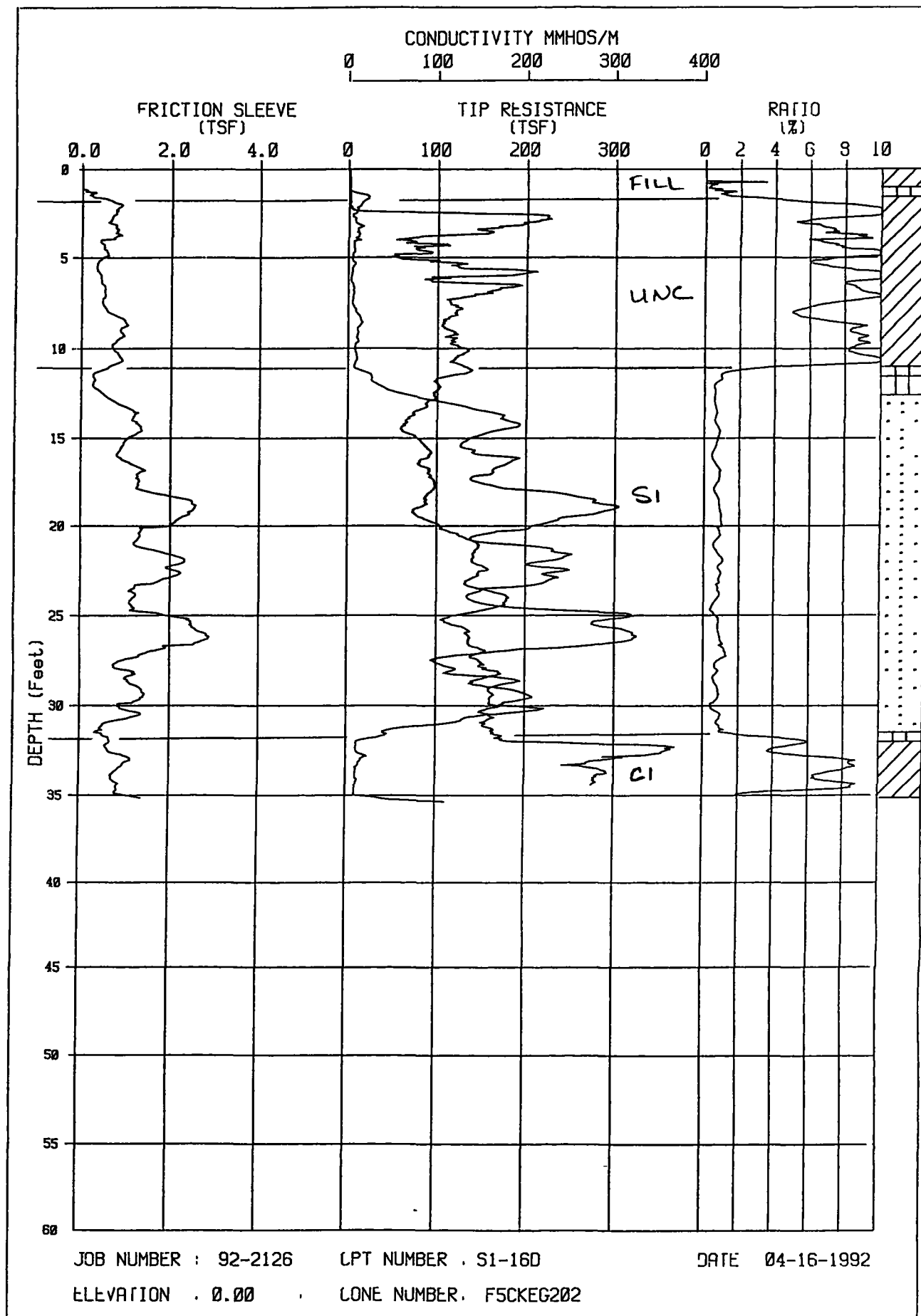
072488



072489



072490



JOB NUMBER : 92-2126

CPT NUMBER : S1-160

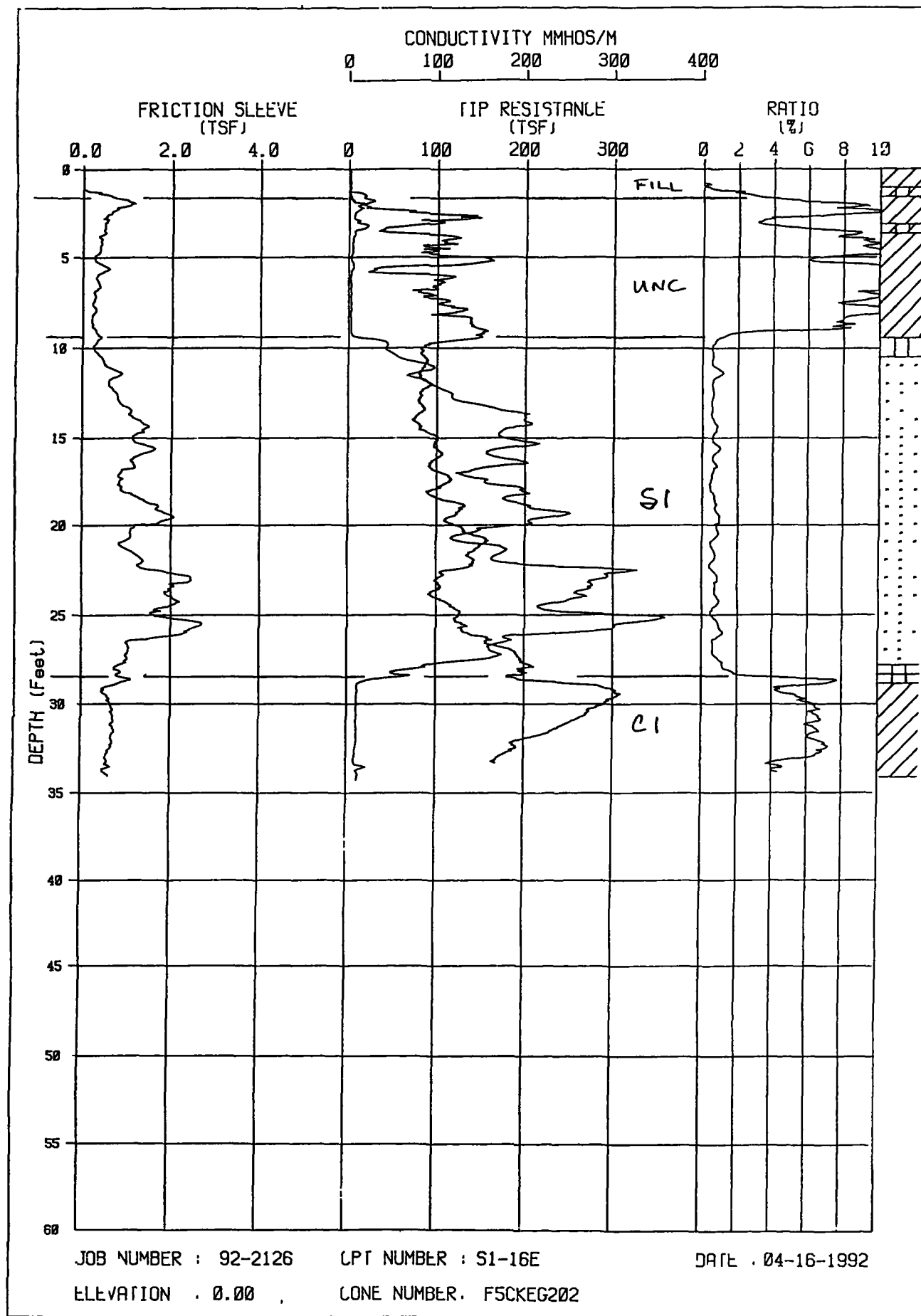
DATE 04-16-1992

ELEVATION : 0.00

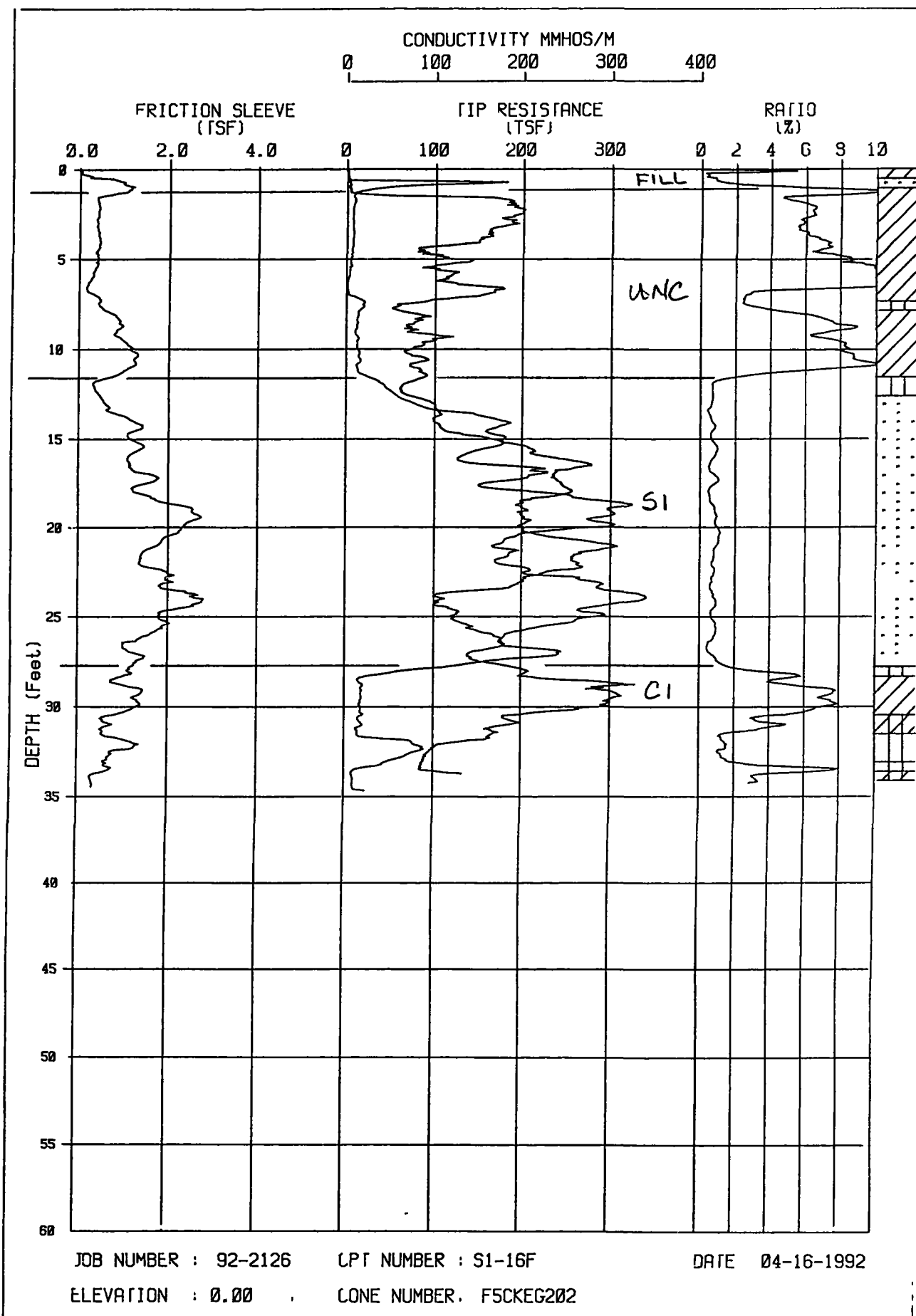
CONE NUMBER: F5CKEG202

FUGRO GEOSCIENCES, INC

072491



072492



JOB NUMBER : 92-2126

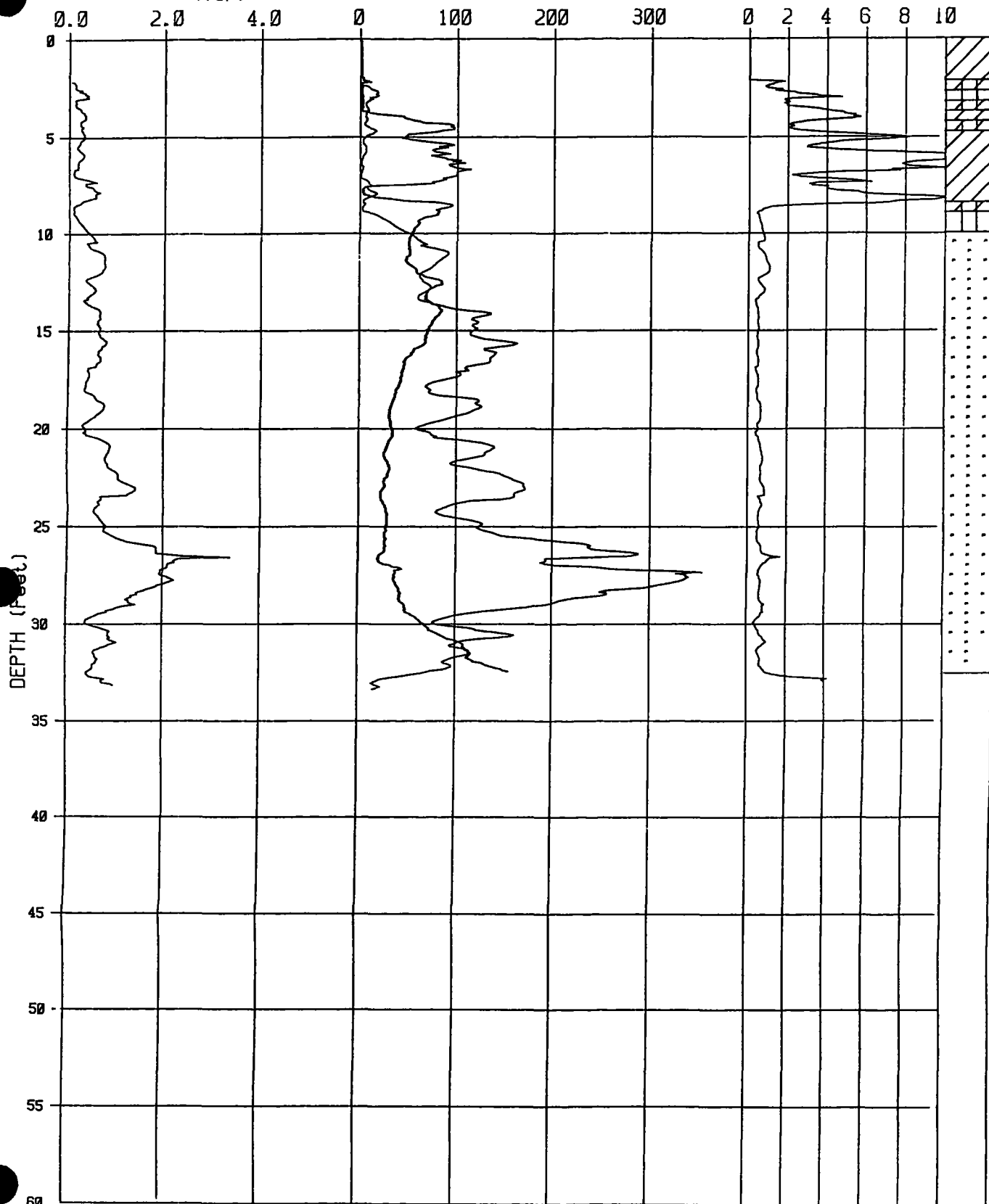
LPT NUMBER : S1-16F

DATE 04-16-1992

ELEVATION : 0.00

CONE NUMBER. F5CKEG202

072493

CONDUCTIVITY MMHOS/M
0 100 200 300 400FRICTION SLEEVE
(TSF)TIP RESISTANCE
(TSF)RATIO
(%)

JOB NUMBER . 92-2126

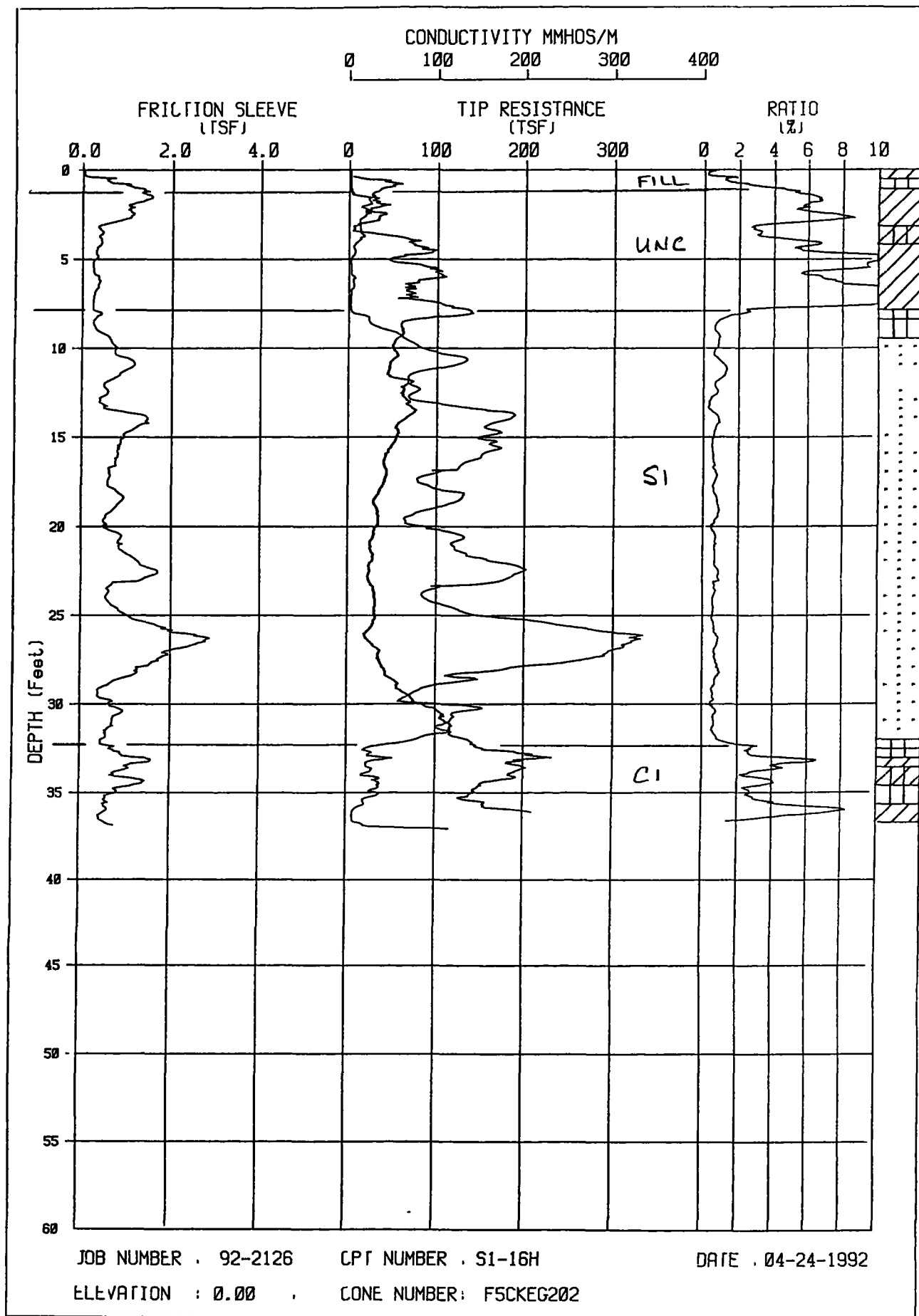
CPT NUMBER . S1-16H

DATE . 04-23-1992

ELEVATION : 0.00

CONE NUMBER: F5CKEG202

072494



JOB NUMBER . 92-2126

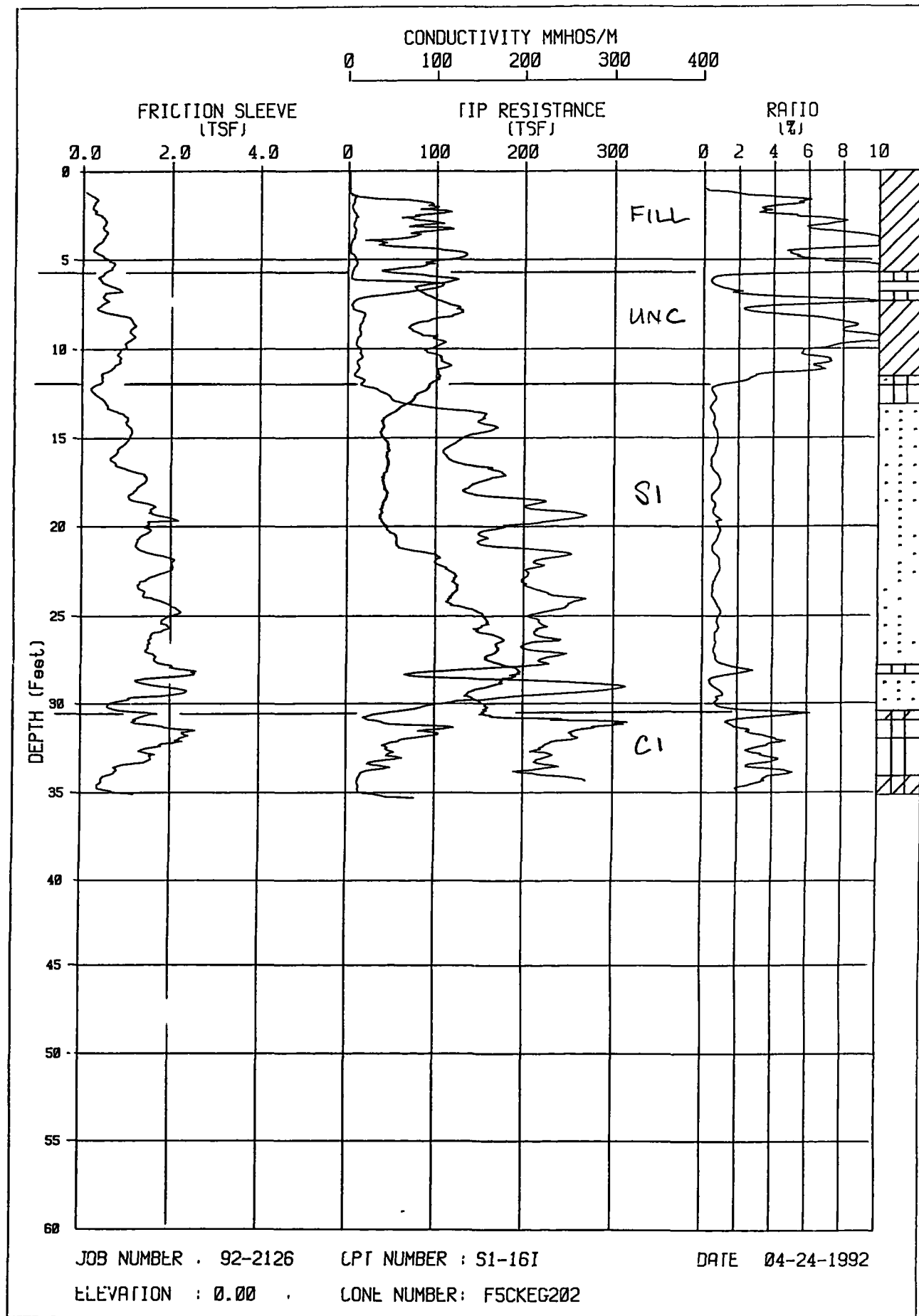
CPT NUMBER . S1-16H

DATE . 04-24-1992

ELEVATION : 0.00

CONE NUMBER: F5CKEG202

072495



JOB NUMBER . 92-2126

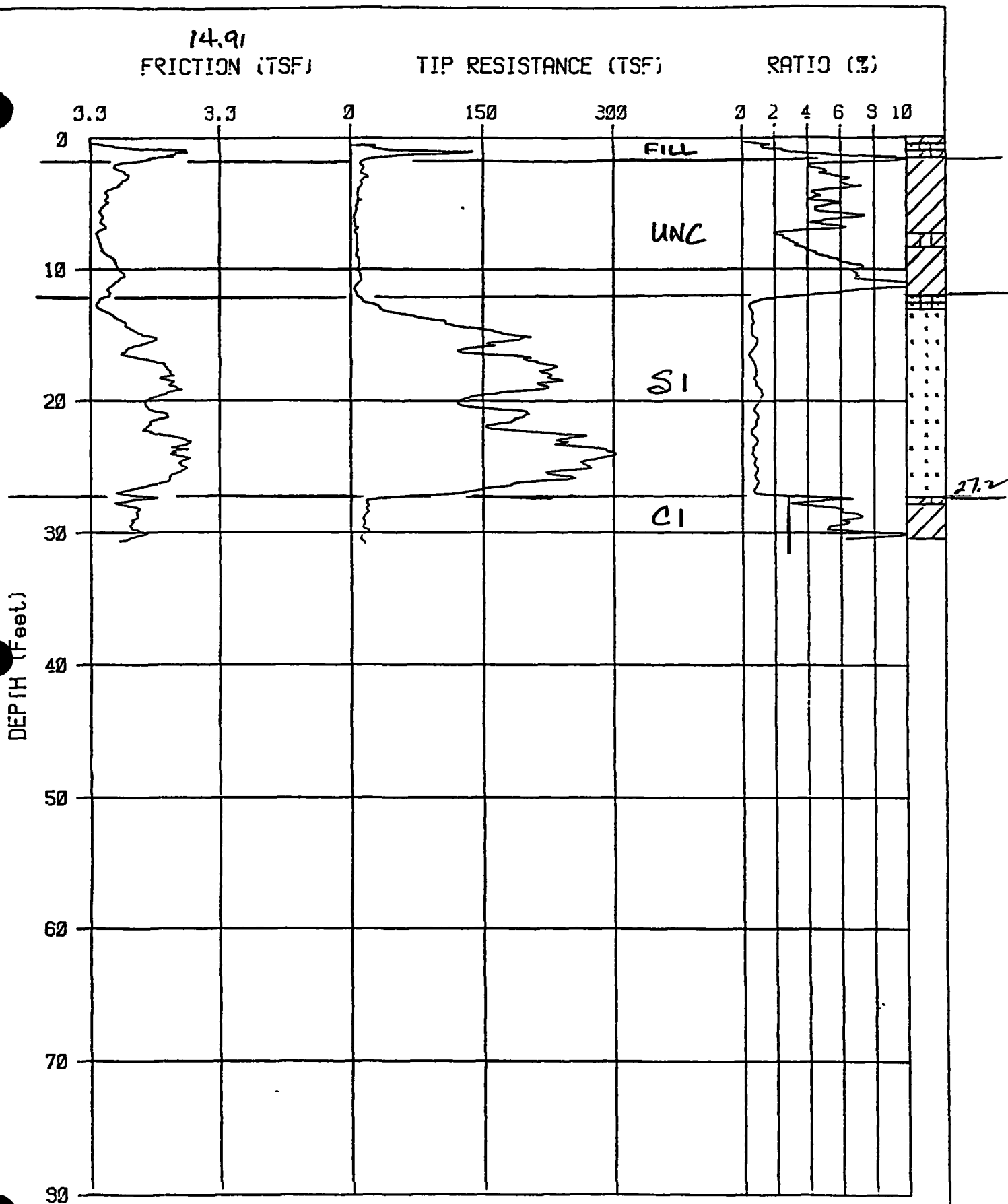
CPT NUMBER : S1-16I

DATE 04-24-1992

ELEVATION : 0.00

CONE NUMBER: F5CKEG202

072496



JOB NUMBER . 91-1118

CPT NUMBER . SI-17 N3240 E3893

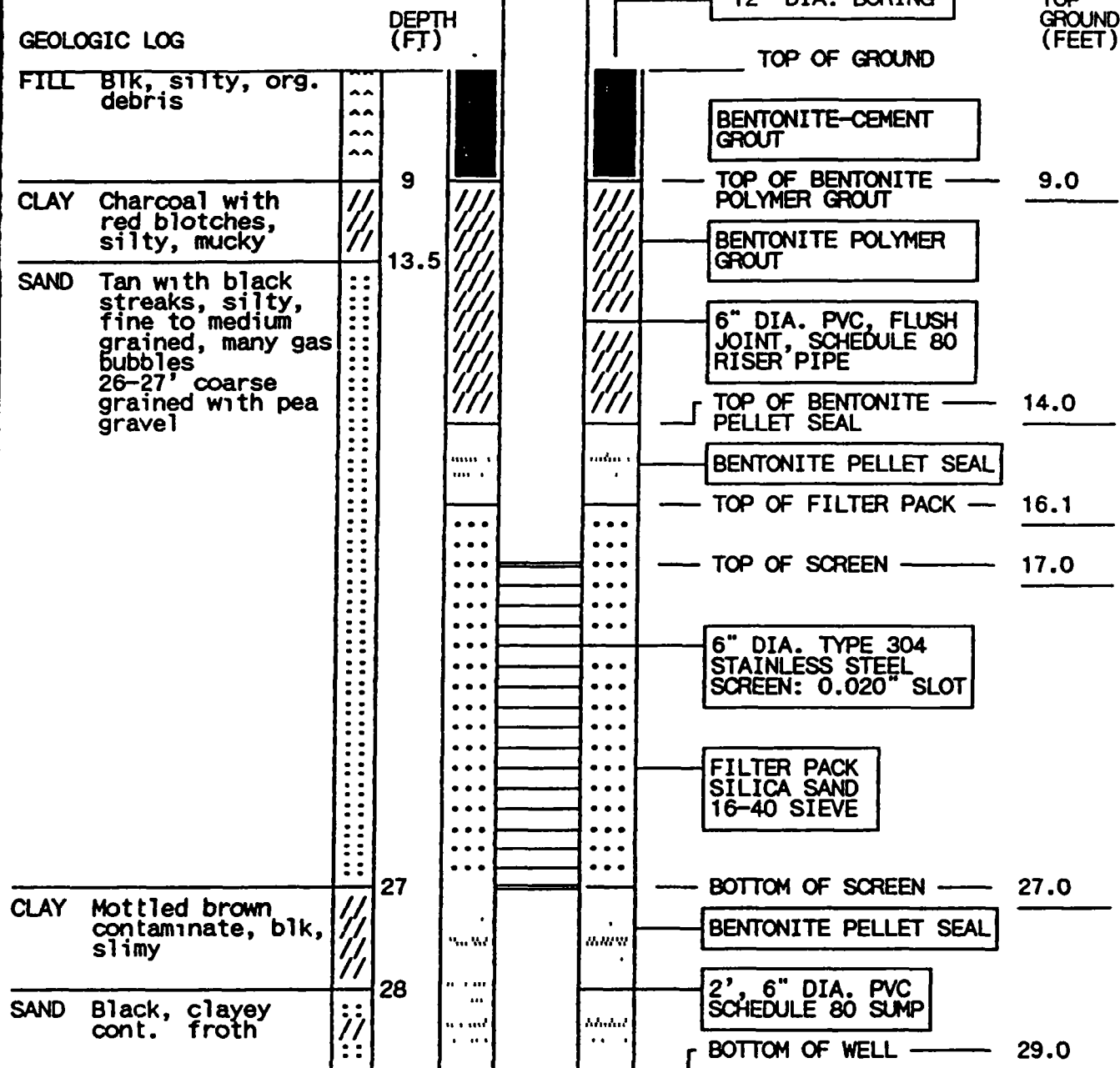
DATE . 06-18-1991

ELEVATION 0.00

CONE NUMBER . F5CKEV600

072497

WELL CONSTRUCTION LOG FRENCH, LTD. SUPERFUND SITE		CONTRACTOR: LAYNE ENVIRONMENTAL SERVICES		BECHTEL JOB NUMBER: 21454-100	WELL NUMBER: S1-17
GEOLOGIST: J. T. SMITH	DATE BEGUN: 7-3-91	DATE COMPLETED: 7-5-91	COORDINATES:	PAGE 1 OF 1	

GROUND SURFACE
ELEVATION: 14.91

NO SCALE (NOTE DEPTH TO BOTTOM OF BORING IF DIFFERENT THAN BOTTOM OF WELL: 30.0')

DRILLING AND SAMPLING NOTES:

Highly contaminated well, Tyvek required.

OVM READINGS: 1.1 ppm 0-9', 5.0 ppm 9-11.5',
6-11 ppm 21-23', 85 ppm @ 11.5-13.5',
13 ppm 28-30'

SAMPLING

SAMPLE NO.	INTERVAL (FEET)
1	11.5 TO 13.5
2	19.0 TO 21.0
3	26.0 TO 28.0

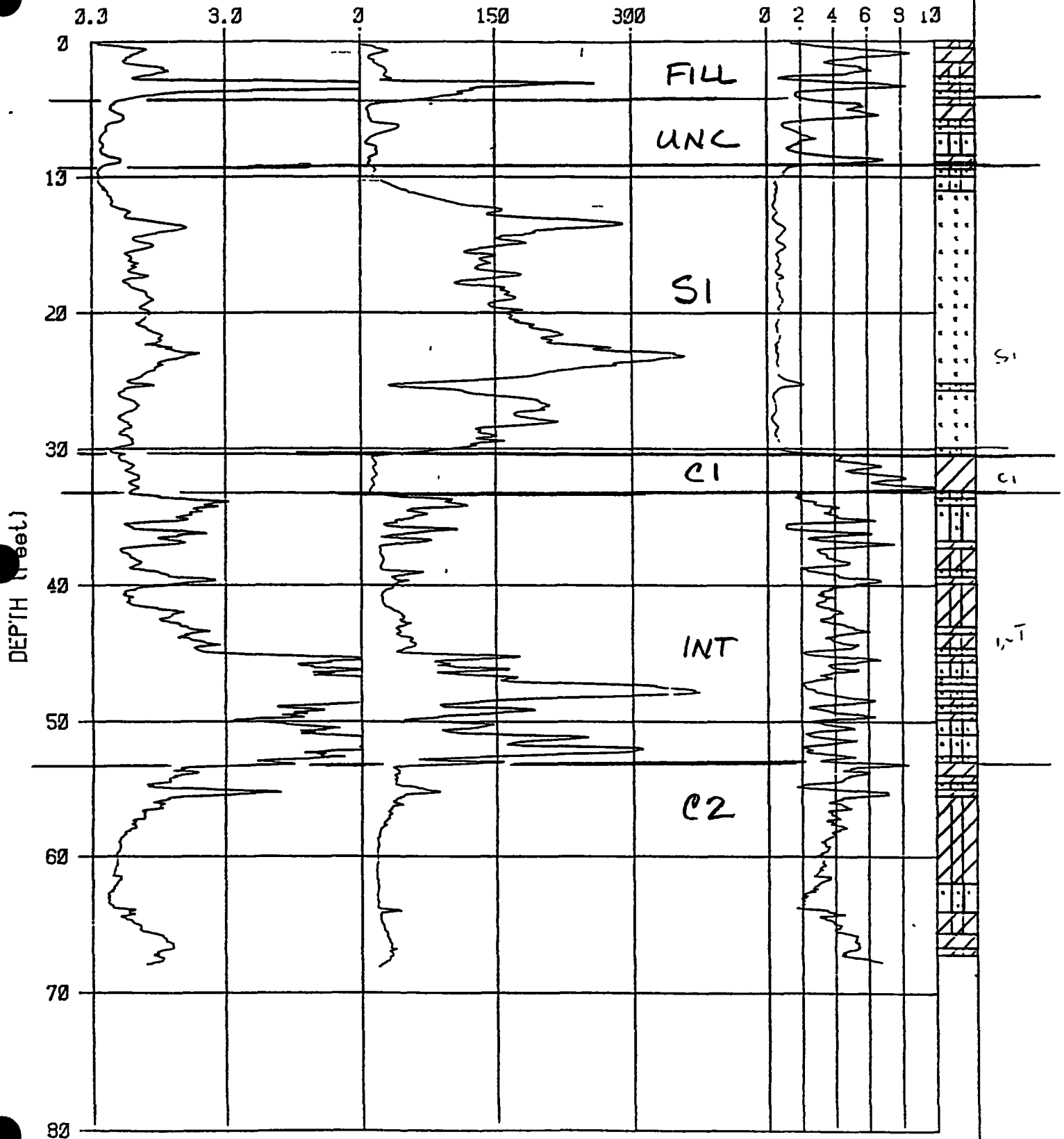
072498

1457

FRICITION (TSF)

TIP RESISTANCE (TSF)

RATIO (%)



JOB NUMBER . 91-1118

CPT NUMBER . INT-17 N3257 E3923

DATE . 06-24-1991

ELEVATION . 0.00

CONE NUMBER . F5CKE709

072499

WELL CONSTRUCTION LOG FRENCH, LTD. SUPERFUND SITE		CONTRACTOR: LAYNE ENVIRONMENTAL SERVICES		BECHTEL JOB NUMBER: 21454-100	WELL NUMBER: INT-17
GEOLOGIST: R. YEAGER	DATE BEGUN: 6/25/91	DATE COMPLETED: 7/2/91	COORDINATES:	PAGE 1 OF 1	

GROUND SURFACE ELEVATION: <u>14.57</u>							
GEOLOGIC LOG	DEPTH (FT)			12" DIA. BORING	DEPTH FROM TOP OF GROUND (FEET)		
CLAY Black, some brn. grav. styrofoam pieces top first foot. Very strong odor.				TOP OF GROUND			
				BENTONITE-CEMENT GROUT			
				TOP OF BENTONITE POLYMER GROUT	10		
SAND Gray, fine to med with some coarse grained, few shells.	13			BENTONITE POLYMER GROUT			
				6" DIA. PVC, FLUSH JOINT, SCHEDULE 80 RISER PIPE			
CLAY Tan, silty with some sand, interbeds of gray sandy clay and clayey, silty sand.	30			TOP OF BENTONITE PELLET SEAL	35		
Mostly gray color below 40'				BENTONITE PELLET SEAL			
@49' tan, fat clay				TOP OF FILTER PACK	37		
				TOP OF SCREEN	39		
				6" DIA. TYPE 304 STAINLESS STEEL SCREEN: 0.008" SLOT			
				FILTER PACK SILICA SAND 30-70 SIEVE			
CLAY Black and tan sandy with some silt.	50			BOTTOM OF SCREEN	54		
				BENTONITE PELLET SEAL			
				2', 6" DIA. PVC SCHEDULE 80 SUMP			
				BOTTOM OF WELL	56		

NO SCALE (NOTE DEPTH TO BOTTOM OF BORING IF DIFFERENT THAN BOTTOM OF WELL:)

DRILLING AND SAMPLING NOTES:	SAMPLING	
OVM READINGS: Off mud pit while circulation 0-18 ppm without circulation 0-2 ppm	SAMPLE NO.	INTERVAL (FEET)

C-11

44-38861-1000

DATE: 4-22-2001

LOCATION: 0-4

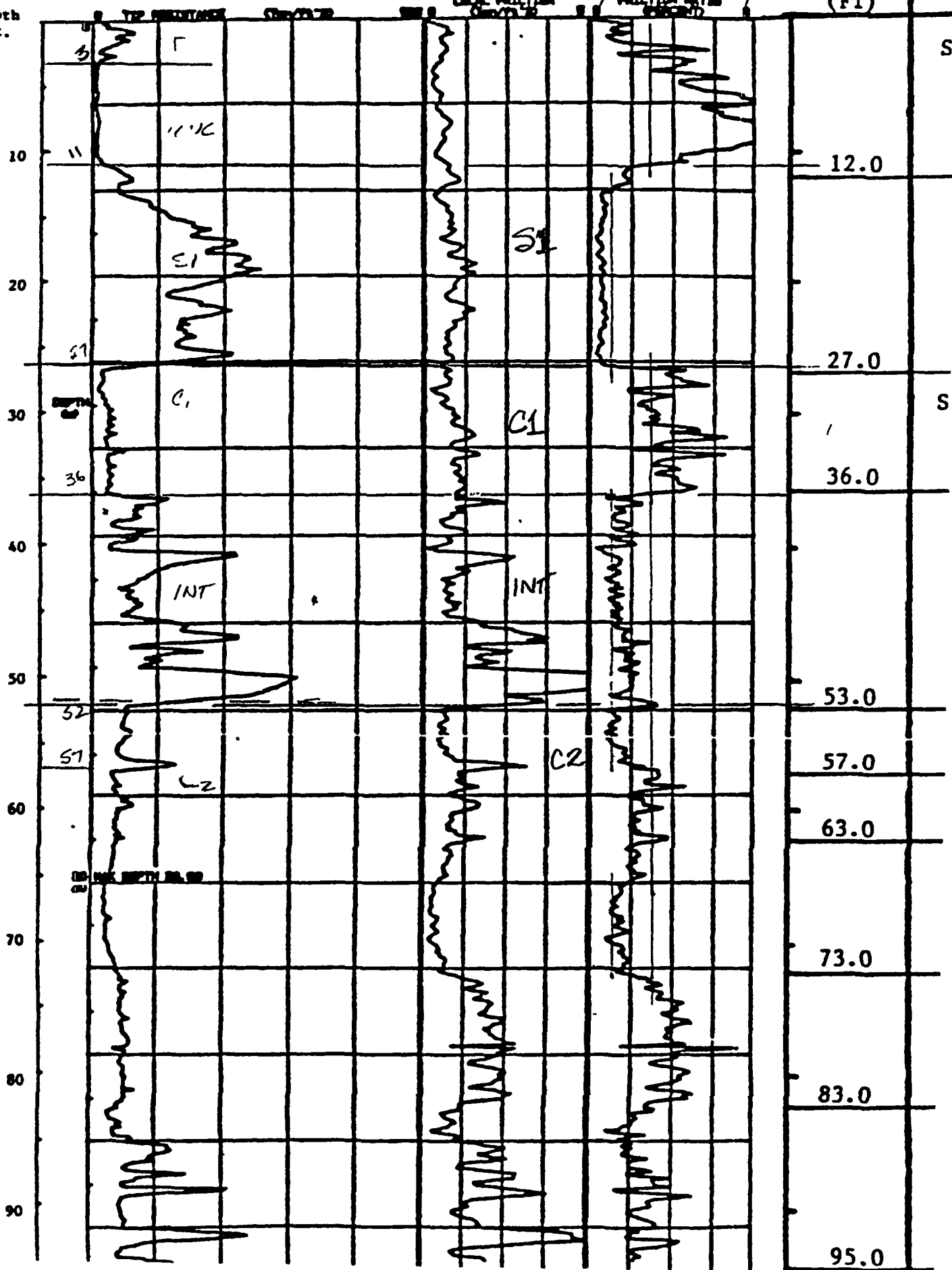
FILE # 100-421

LEGAL INFORMATION

[illegible]

67. STRATA
(FT)

Depth
Fe.




RESOURCE ENGINEERING
 SUBSURFACE EXPLORATION

Sheet 1 of 1

**LITHOLOGIC LOG AND CONSTRUCTION
OF DB-7**

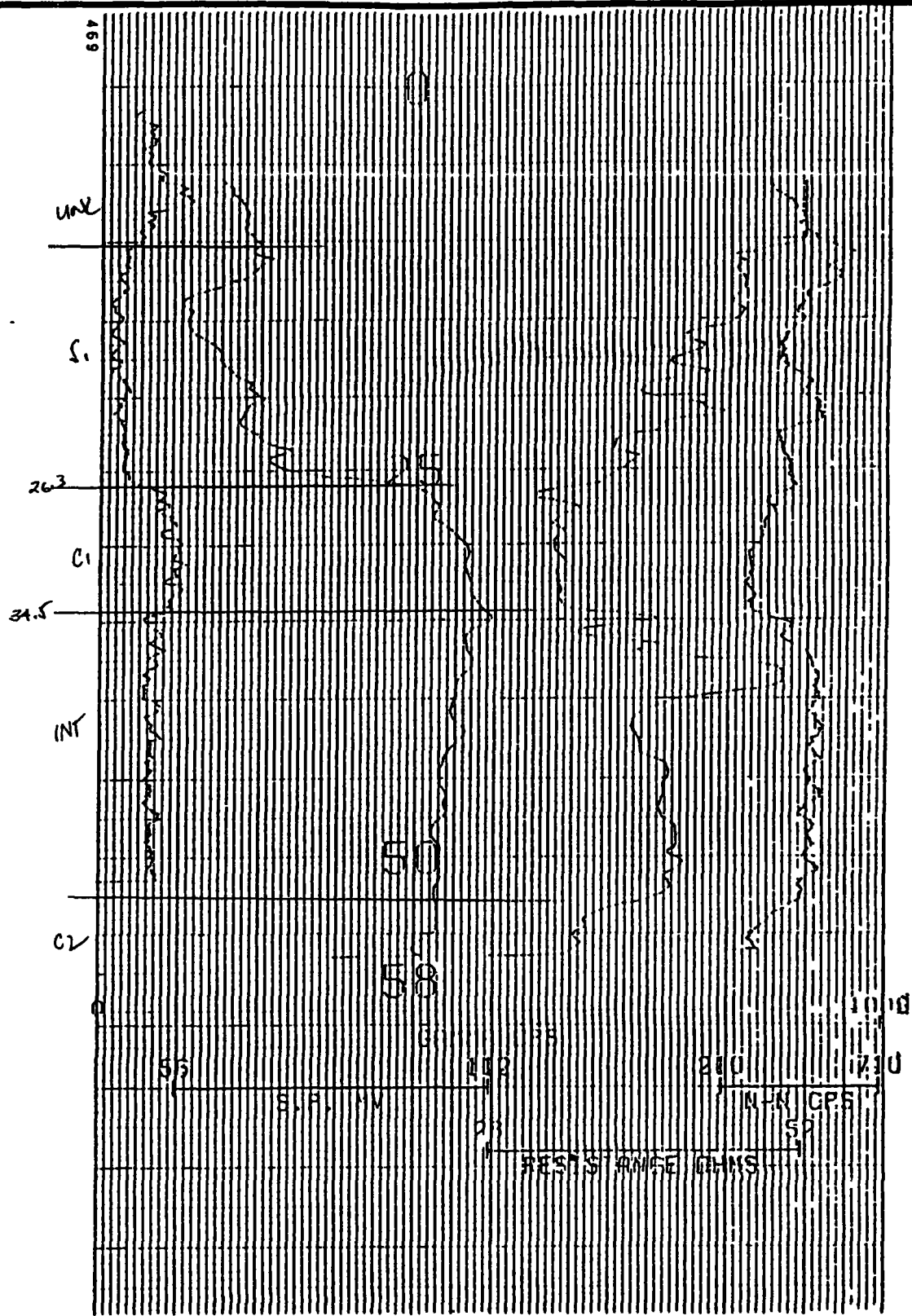
Client FRENCH, LTD.
 Project Name French, Ltd.
 Project Location Crosby, Texas
 Job No 275-14 Boring No DB-7
 Logged By P. Mann, Hydrogeologist
 Approved By _____
 Drilled By Gulf Coast Coring - Rosenberg, Texas

DRILLING AND SAMPLING INFORMATION
 Date Started 7/18/86 Date Completed 7/19/86
 Method Rotary Wash Total Depth 58.0'

DEPTH IN FEET	DESCRIPTION	STRATUM ELEVATION IN FEET	SAMPLE NO.	SAMPLE TYPE	RECOVERY	GRAPHIC LOG	HMU (IN ppm)	OVA (IN ppm)	SAMPLED FOR CHEM ANALYSIS
0	SURFACE ELEVATION <u>15.7</u> <i>sf.</i>								
	SILTY SAND (FILL?), gray and black; odor detected	2.0	0-2	ST	1.0'		50		
5	SILTY CLAY, gray, massive, moderately firm	UNC	2-4	SS	1.0'		<1		
			4-6	ST	1.8'		<1		
			6-8	ST	1.9'		1.0		
			8-10	SS	0.3'		<1		
10	SILTY SAND, ranging from fine to coarse grained, gray, poorly sorted, graded	10.4	10-12	SS	1.4'		<1		
			12-14	SS	1.7'			1.0	
15	saturated below 12.0'		14-16	SS	0.7'		1	6	
			16-18	SS	1.1'		<1	80	
20	18.0' to 22.0' very dark gray, discolored silty sand	S1	18-20	SS	1.3'			100	
			20-22	SS	1.1'		2	200	
			22-24	SS	1.0'			10	
			24-26	SS	1.0'		3		
25	24.5' with pebble sized gravel	26.3	26-28	ST	1.5'		3		
	SILTY CLAY, reddish brown and gray, mottled, massive, very firm	26.3-35.6 = 8 3 C1	28-30	ST	1.9'		<1		
30			30-32	ST	1.8'		<1		
			32-34	ST	1.7'		<1		
			34-36	ST	1.6'		<1		
35	below 35.6' increasingly sandy, fine grained with greenish gray color	38.0	36-38	ST	1.8'		<1		
	CLAYEY SAND WITH SILT, very fine grained, greenish gray, moist	↑ 41.0	38-40	ST	1.5'		<1		
40			40-42	SS	1.2'		<1	2	
	SILTY TO SANDY CLAY, gray, brown and reddish brown, mottled, massive, very firm	↓ INT 46.0	42-44	ST	1.35'		<1	2	
45			44-46	ST	1.2'		<1		
	CLAYEY SAND, very fine to fine grained, gray and brown, mottled, dense, moist	↓ 53.0	46-48	ST	1.7'		<1		
			48-50	ST	1.6'		<1		
50	below 52.0' reddish brown color observed		50-52	ST	1.5'		<1		
			52-54	ST	1.65'		<1		
55	CLAY TO SILTY CLAY, reddish brown and gray, mottled, massive, very firm	C2	54-56	ST	1.5'		<1		
			56-58	ST	1.65'		<1		
60	BORING COMPLETED AT 58.0 FEET, BOREHOLE WAS GEOPHYSICALLY LOGGED, THEN SEALED WITH CEMENT BENTONITE GROUT.	58.0							

SAMPLER TYPE
 SS - DRIVEN SPLIT SPOON CA - CONTINUOUS FLIGHT AUGER
 ST - PRESSED SHELBY TUBE RC - ROCK CORE

BORING METHOD
 HSA - HOLLOW STEM AUGERS DC - DRIVING CASING
 CFA - CONTINUOUS FLIGHT AUGERS MD - MUD DRILLING



ENVIRONMENTAL CONSULTANTS
HOUSTON, TEXAS

FRENCH LIMITED

DRAWN BY

DATE:

11-22-86

PROJECT NO.

275-14

BOOKMARK

072503

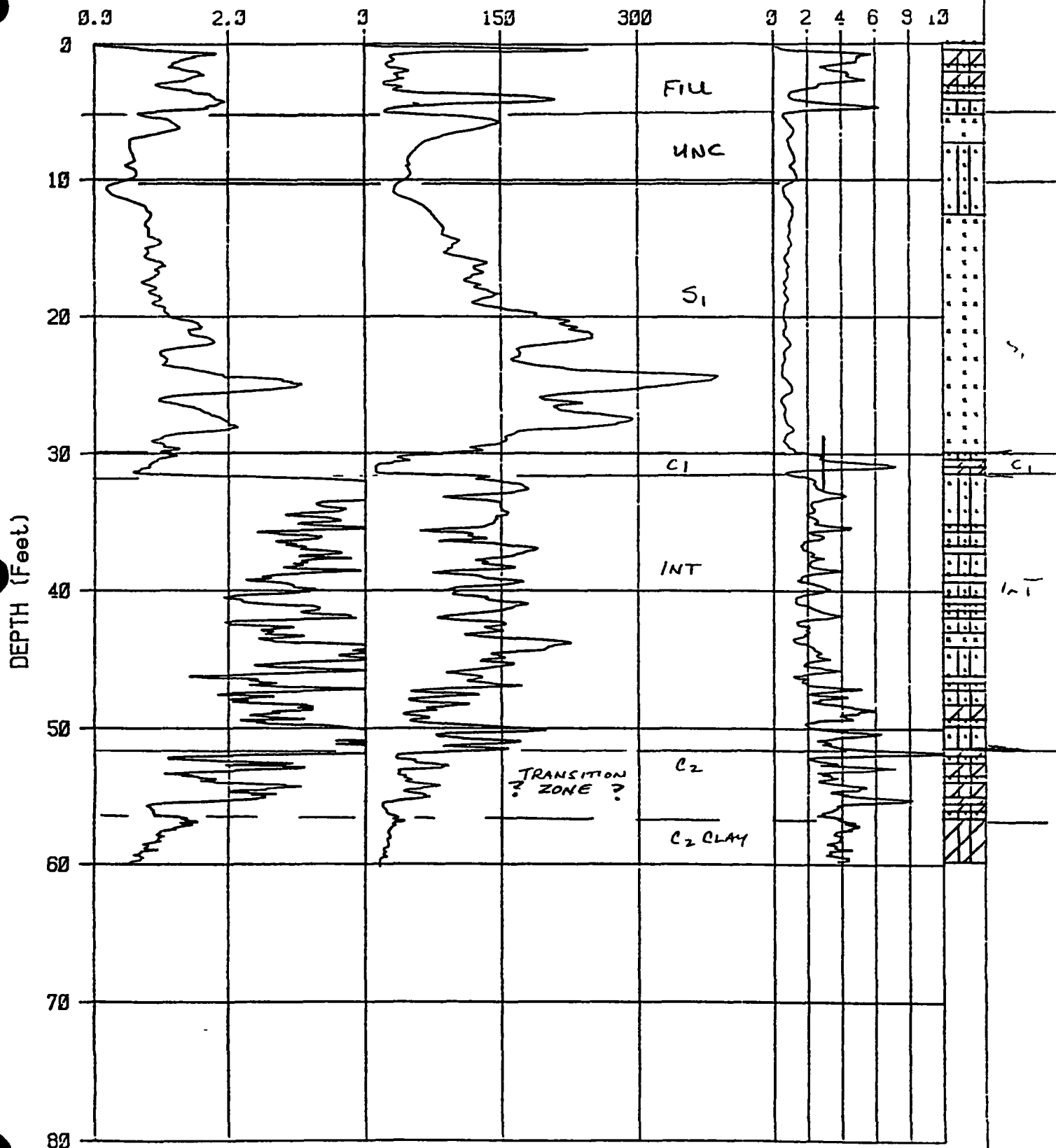
Appendix 4

**Cone Penetrometer Logs
INT-11 Area**

01502436

072504

14.29*
 FRICTION (TSF) TIP RESISTANCE (TSF) RATIO (%)



JOB NUMBER : 91-1118

CPT NUMBER : INT-10 N3187 E3330

DATE : 06-13-1991

ELEVATION : 0.00

WELL 3163 3335
 CONE NUMBER. F5CKEV600

072505

WELL CONSTRUCTION LOG FRENCH, LTD. SUPERFUND SITE		CONTRACTOR: LAYNE ENVIRONMENTAL SERVICES		BECHTEL JOB NUMBER: 21454-100	WELL NUMBER: INT-10
GEOLOGIST: J.T.SMITH	DATE BEGUN: 6-27-91	DATE COMPLETED: 7-2-91	COORDINATES:	PAGE 1 OF 1	

GROUND SURFACE
ELEVATION: 14.29*

GEOLOGIC LOG

DEPTH
(FT)DEPTH
FROM
TOP OF
GROUND
(FEET)FILL Road base grav.,
silt, org. debris
and roots.SAND Tan-gray, med.
grained, qtz, rnd.
loose.
8-13' grayer.
18-27' bl. oxide
staining
27-29 tan, well
rnd. pea gravelPEA GRAVEL Clayey,
charcoal with red iron
stains Hly varieg.
well rnd. dk/lt qtz.
petrified wd.SAND Grn-gray to gray
tan, fine to med.
grained.
pea gravel frags @
49'SAND & PEA GRAVEL
with tan clay and
iron stained
siltstone.

SAND clayey, stained

SAND Gray green to gray
fine to medium
grained, some dark
stainingCLAY Red-brown,
gumbo, plastic

5

29

34

49

50

51

69.6

12" DIA. BORING

TOP OF GROUND

BENTONITE-CEMENT
GROUTTOP OF BENTONITE
POLYMER GROUTBENTONITE POLYMER
GROUT6" DIA. PVC, FLUSH
JOINT, SCHEDULE 80
RISER PIPETOP OF BENTONITE
PELLET SEAL

BENTONITE PELLET SEAL

TOP OF FILTER PACK

TOP OF SCREEN

6" DIA. TYPE 304
STAINLESS STEEL
SCREEN: 0.008" SLOTFILTER PACK
SILICA SAND
30-70 SIEVE

BOTTOM OF SCREEN

BENTONITE PELLET SEAL

2', 6" DIA. PVC
SCHEDULE 80 SUMP

BOTTOM OF WELL

10

33

35.2

37

57

59

NO SCALE (NOTE DEPTH TO BOTTOM OF BORING IF DIFFERENT THAN BOTTOM OF WELL: 72')

DRILLING AND SAMPLING NOTES:

Hole plugged back to 59' with benseal before setting well.

OVM READINGS: 0.2ppm @ 18-27' 1.0 ppm @ 50-51'

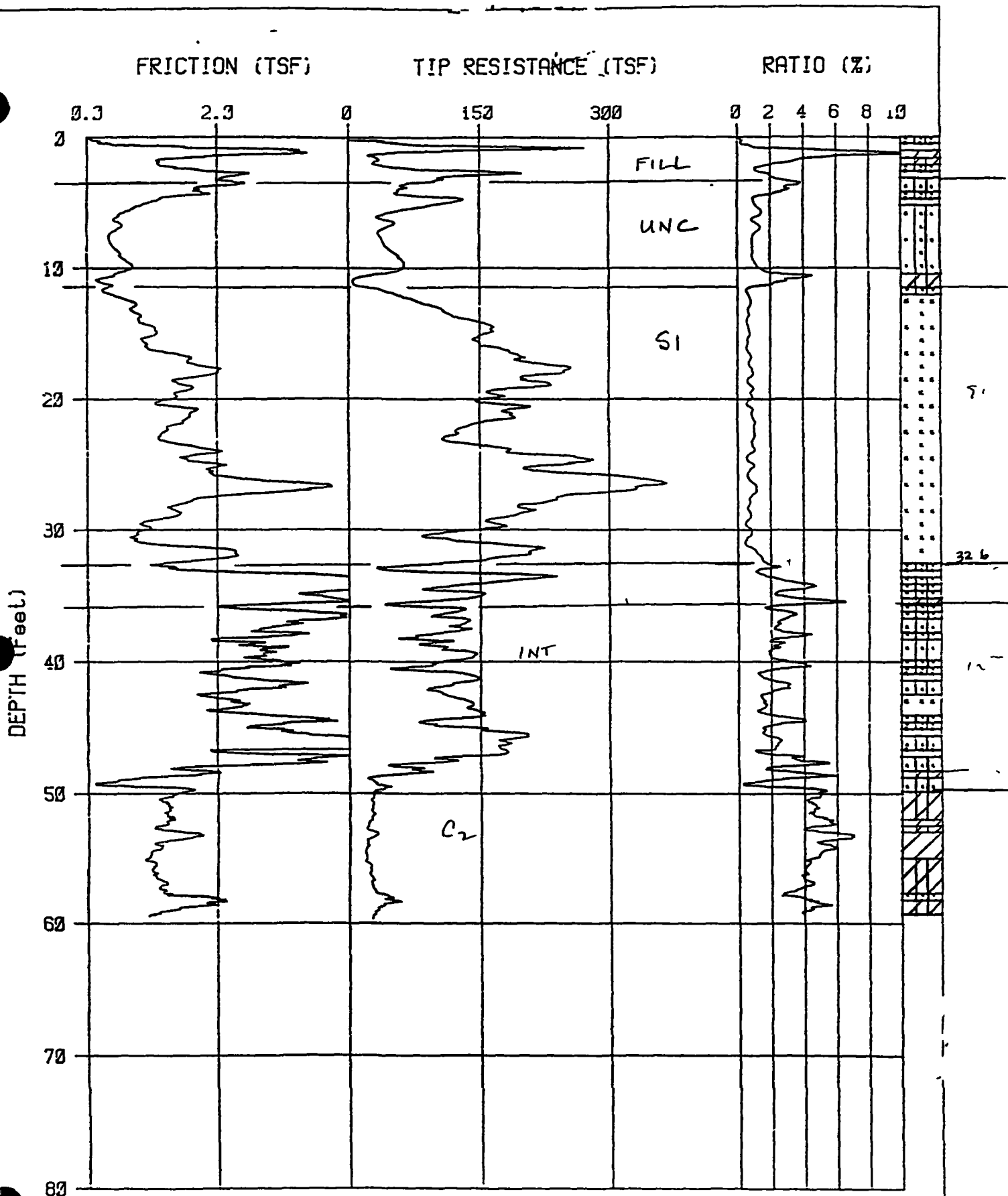
Contaminate found in samples @ 53' & 57'. Strong
oxide stains and odor in samples and cuttings.

SAMPLING

SAMPLE NO.	INTERVAL (FEET)
1	29-30'
2	30-32'
3	40-42'
4	49-50', 51-53



072506



JOB NUMBER : 91-1118

CPT NUMBER : INT-11 N3176 E3426

DATE : 06-13-1991

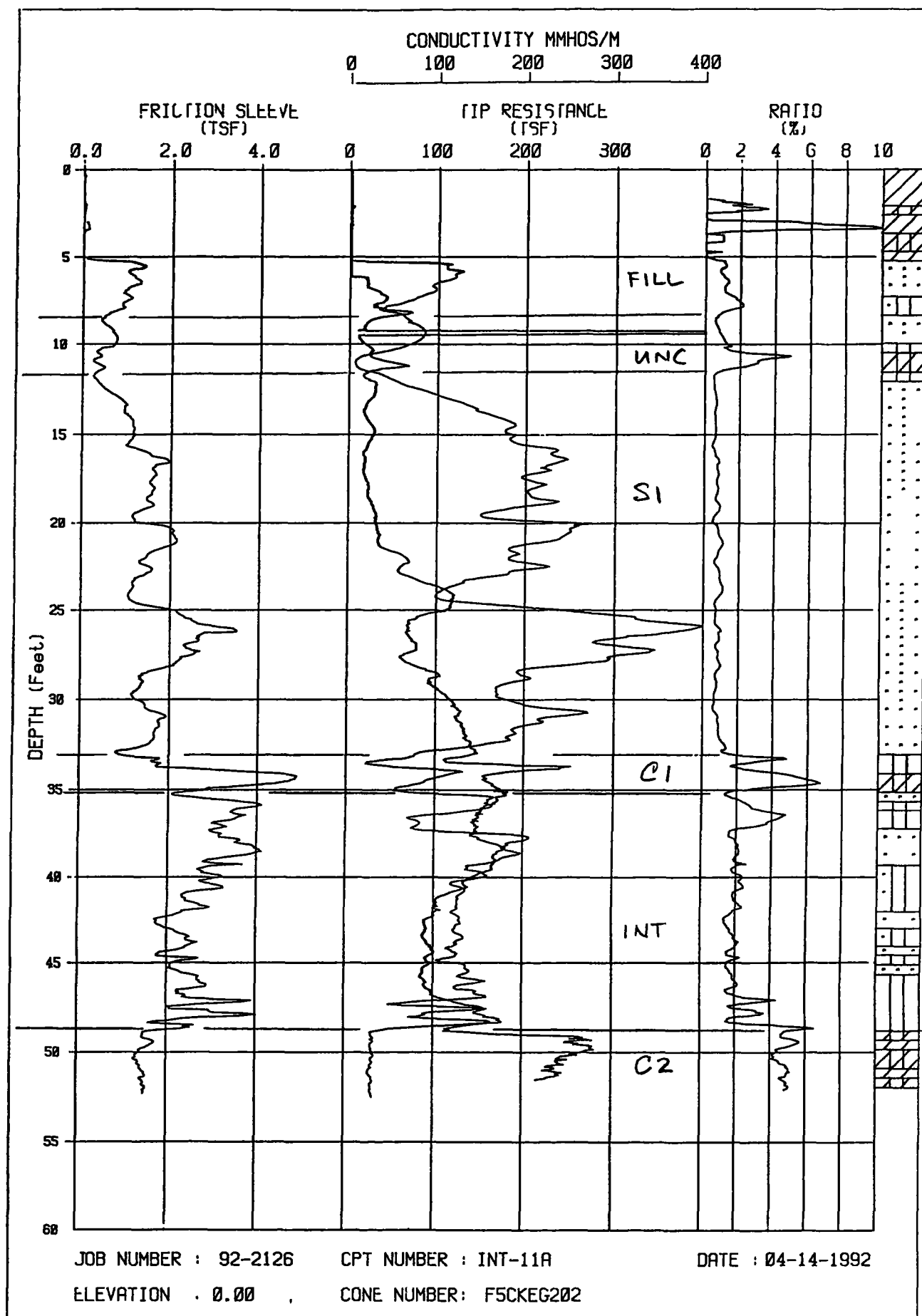
ELEVATION : 0.00

CONE NUMBER : F5CKEV600

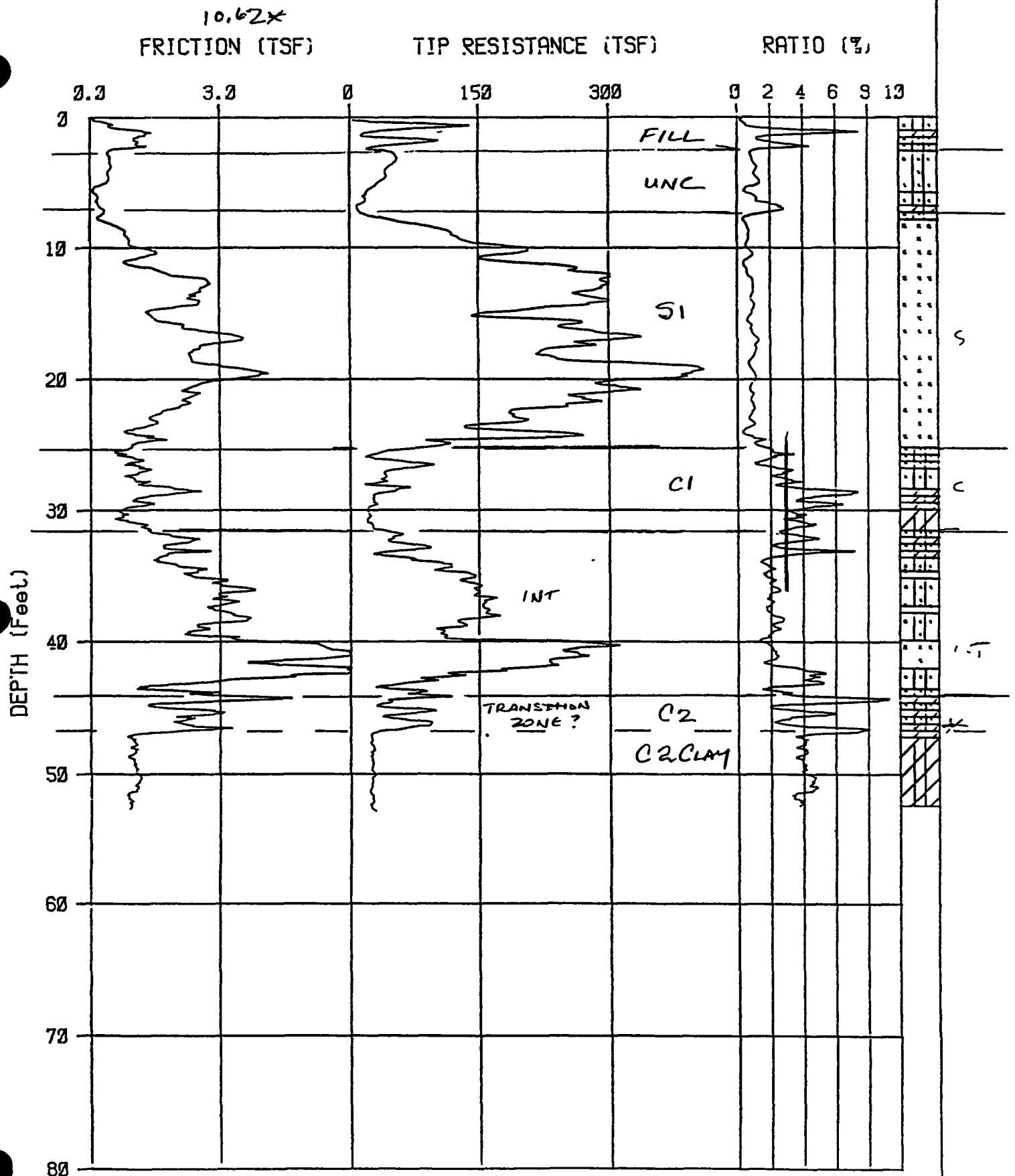
072507



072508



072509



JOB NUMBER : 91-1118

CPT NUMBER INT-19 N3129 E3446

DATE : 06-18-1991

ELEVATION . 0.00

CONE NUMBER. F5CKEV600

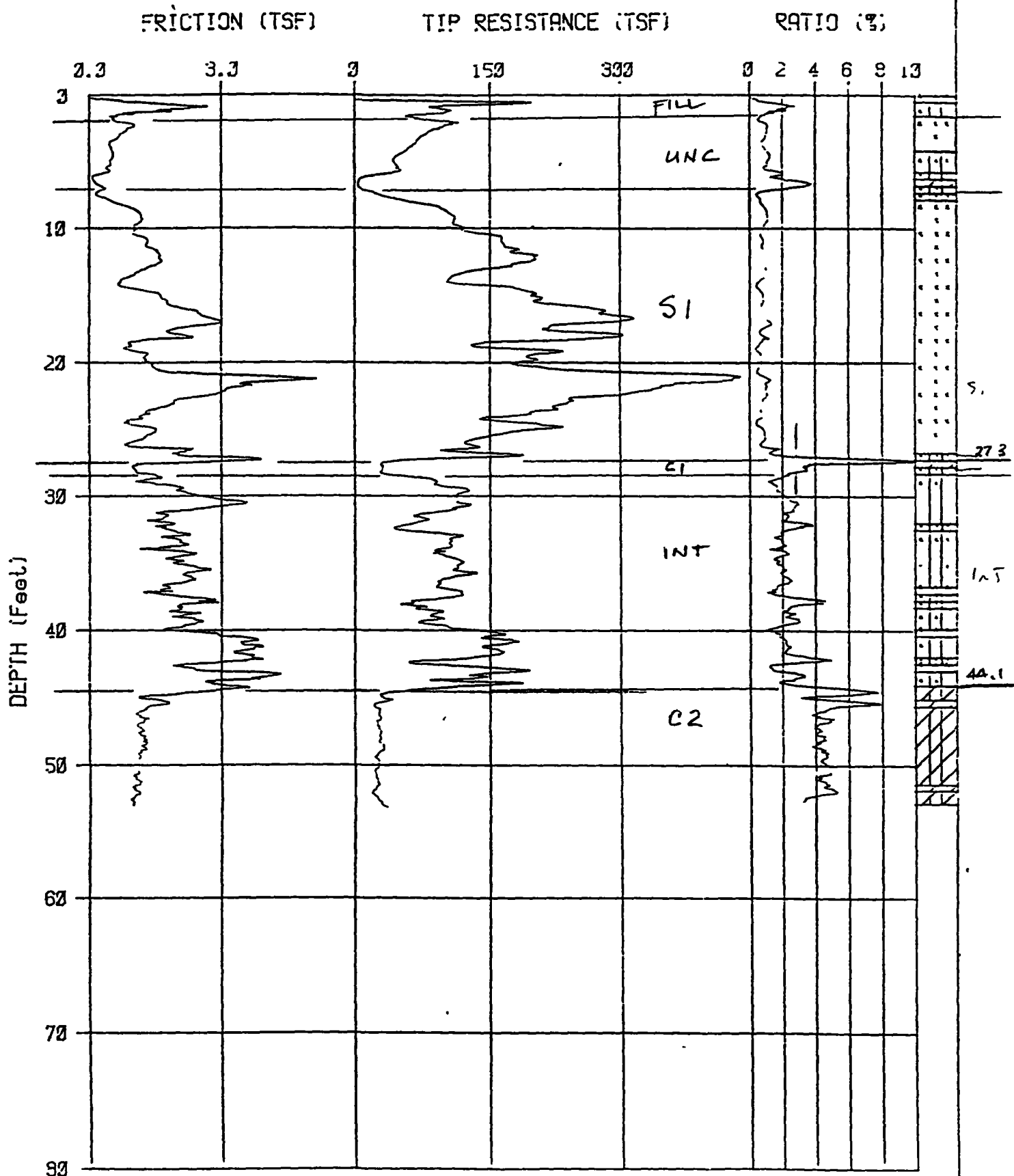
WELL CONSTRUCTION LOG FRENCH, LTD. SUPERFUND SITE		CONTRACTOR: LAYNE ENVIRONMENTAL SERVICES		BECHTEL JOB NUMBER: 21454-100	WELL NUMBER: INT-19
GEOLOGIST: M.A.GAGE	DATE BEGUN: 09-16-91	DATE COMPLETED: 09-16-91	COORDINATES:	PAGE 1 OF 1	

GROUND SURFACE
ELEVATION: 10.62*

NO SCALE (NOTE DEPTH TO BOTTOM OF BORING IF DIFFERENT THAN BOTTOM OF WELL: —)

DRILLING AND SAMPLING NOTES:		SAMPLING	
SAMPLE NO.	INTERVAL (FEET)		
<p>OVM READINGS: 0ppm @ 5', 0ppm @ 10', 2ppm @ 15', 1ppm @ 20', 1ppm @ 25', 1ppm @ 30', 4ppm @ 32', 11ppm @ 35', 13ppm @ 40', 18ppm @ 45', 1ppm @ 50'</p> <p>NOTE 1: Upper bentonite pellet seal not installed because of partial bridging of lower bentonite pellet seal @ 17 and 26'.</p> <p>NOTE 2: Lower bentonite pellet seal partially bridged in the borehole @ 17 and 26'.</p>			

072511



JOB NUMBER : 91-1118

CPT NUMBER : INT-63 N3129 E3331
3127 3376

DATE : 06-18-1991

ELEVATION : 0.00

CONE NUMBER: F5CKEV600

072512

WELL CONSTRUCTION LOG FRENCH, LTD. SUPERFUND SITE		CONTRACTOR: LAYNE ENVIRONMENTAL SERVICES		BECHTEL JOB NUMBER: 21454-100	WELL NUMBER: INT-63
GEOLOGIST: M.A.GAGE	DATE BEGUN: 09-17-91	DATE COMPLETED: 09-17-91	COORDINATES:	PAGE 1 OF 1	

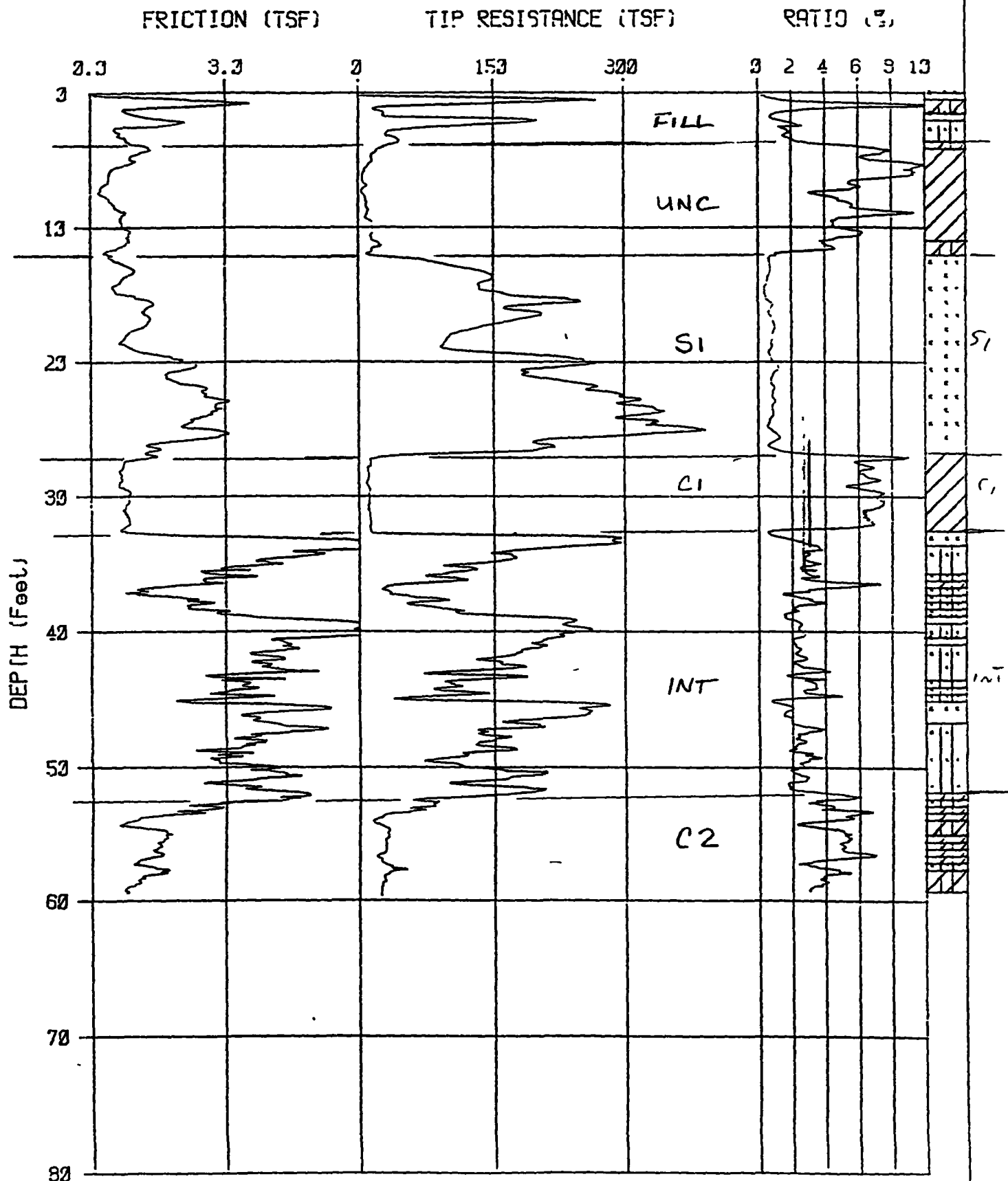
GROUND SURFACE
ELEVATION: 10.55 *

GEOLOGIC LOG	DEPTH (FT)					DEPTH FROM TOP OF GROUND (FEET)
FILL, road gravel					12" DIA. BORING	
					TOP OF GROUND	
SAND, lt olive gry, med to coarse, loose, dry	1				BENTONITE-CEMENT GROUT	
med to gravelly, tr silt & clay @ 8'					TOP OF BENTONITE POLYMER GROUT	10
med to coarse, tr gravel @ 12'					BENTONITE POLYMER GROUT	
v gravelly @ 22'					6" DIA. PVC, FLUSH JOINT, SCHEDULE 80 RISER PIPE	
	25				TOP OF BENTONITE PELLET SEAL	26
CLAY, lt brn, med stiff, little silt & sand					BENTONITE PELLET SEAL	
	30				TOP OF FILTER PACK	29
SAND, lt olive gry, v fine to fine, loose, tr silt					TOP OF SCREEN	31
	45				6" DIA. TYPE 304 STAINLESS STEEL SCREEN: 0.010" SLOT	
					FILTER PACK SILICA SAND 16-40 SIEVE	
CLAY, lt brn, stiff, tr silt & sand					BOTTOM OF SCREEN	46
					BENTONITE PELLET SEAL	<SEE NOTE 1>
					2', 6" DIA. PVC SCHEDULE 80 SUMP	
					BOTTOM OF WELL	48

NO SCALE (NOTE DEPTH TO BOTTOM OF BORING IF DIFFERENT THAN BOTTOM OF WELL: —)

DRILLING AND SAMPLING NOTES:	SAMPLING				
<p>OVM READINGS: 0ppm @ 5', 0ppm @ 10', 1ppm @ 15', 1ppm @ 20', 3ppm @ 25', 4ppm @ 30', 2ppm @ 35', <1ppm @ 40', 3ppm @ 45', <1ppm @ 48'</p> <p>NOTE 1: One foot of drill cuttings at bottom of borehole from 47 to 48'. One foot bentonite pellets placed from 46 to 47'.</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">SAMPLE NO.</th> <th style="width: 50%;">INTERVAL (FEET)</th> </tr> </thead> <tbody> <tr> <td style="height: 100px;"></td> <td></td> </tr> </tbody> </table>	SAMPLE NO.	INTERVAL (FEET)		
	SAMPLE NO.	INTERVAL (FEET)			

072513



JOB NUMBER . 91-1118

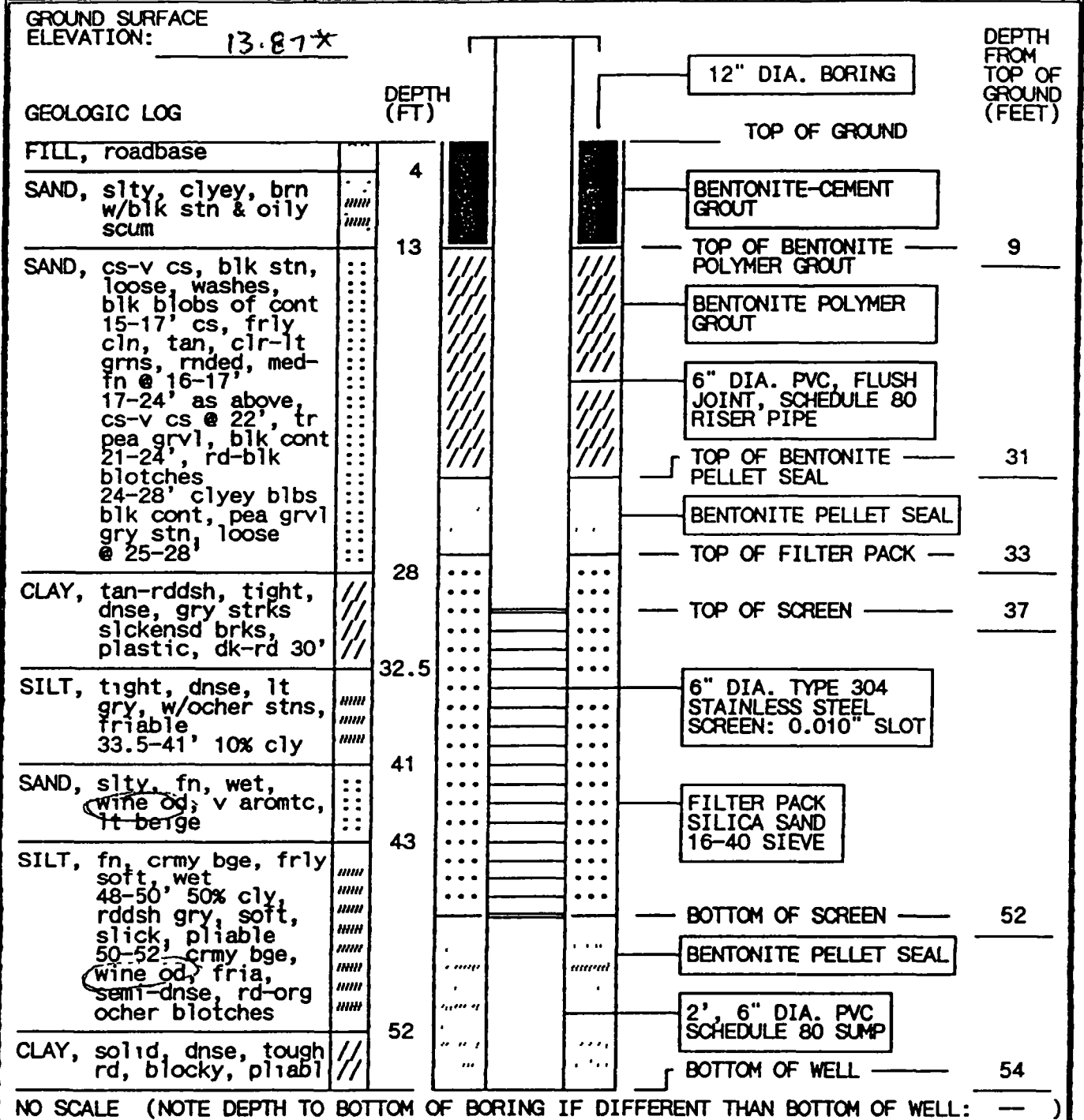
CPT NUMBER : INT-64 N3169 E3491

DATE . 96-17-1991

ELEVATION . 2.20

CONE NUMBER: F5CKEV600

WELL CONSTRUCTION LOG FRENCH, LTD. SUPERFUND SITE		CONTRACTOR: LAYNE ENVIRONMENTAL SERVICES		BECHTEL JOB NUMBER: 21454-100	WELL NUMBER: INT-64
GEOLOGIST: J.T.SMITH	DATE BEGUN: 09-09-91	DATE COMPLETED: 09-10-91	COORDINATES:	PAGE 1 OF 1	



DRILLING AND SAMPLING NOTES:

During drilling a considerable amount of blk blobs of contaminate (goeey-thick) was trapped within the sands. In air/sunlight, most blobs oxidized completely.

OVM READINGS: 3ppm @ 15-17', 3ppm @ 24-26',
50ppm @ 27-29', 15ppm @ 31-33',
48ppm @ 41-43', 32ppm @ 50-52'

SAMPLING

SAMPLE NO.	INTERVAL (FEET)
#1 sp1 spn	15-17'
#2 " "	24-26'
#3 " "	27-29'
#4 " "	31-33'
#5 " "	41-43'
#6 " "	50-52'

072515

MONITORING WELL LOG FRENCH, LTD. SUPERFUND SITE		CONTRACTOR: LAYNE ENVIRONMENTAL SERVICES		BECHTEL JOB NUMBER: 21454-100		WELL NUMBER: INT-114	
GEOLOGIST: M.A.GAGE		DATE BEGUN: 09-05-91		DATE COMPLETED: 09-09-91		COORDINATES:	
						PAGE 1 OF 1	

GROUND SURFACE
ELEVATION: _____

GEOLOGIC LOG

FILL, oyster shells	Fill	1
SAND, lt olive gry to lt brn, med, loose	:::	
SAND, as above, tr silt & clay	:::	
CLAY, med lt gry, med stiff, some sand	///	
SAND, lt olive gry, v fine to fine, loose, tr silt	:::	
CLAY, lt brn, stiff, tr silt	///	

DEPTH
(FT)

51

27

29

46

INT

42

12" DIA. BORING

TOP OF GROUND

BENTONITE-CEMENT
GROUT

TOP OF BENTONITE
POLYMER GROUT — 10

BENTONITE POLYMER
GROUT

6" DIA. PVC, FLUSH
JOINT, SCHEDULE 80
RISER PIPE

TOP OF BENTONITE
PELLET SEAL — 27

BENTONITE PELLET SEAL

TOP OF FILTER PACK — 29

TOP OF SCREEN — 31

6" DIA. TYPE 304
STAINLESS STEEL
SCREEN: 0.010" SLOT

FILTER PACK
SILICA SAND
16-40 SIEVE

BOTTOM OF SCREEN — 46

BENTONITE PELLET SEAL

2', 6" DIA. PVC
SCHEDULE 80 SUMP

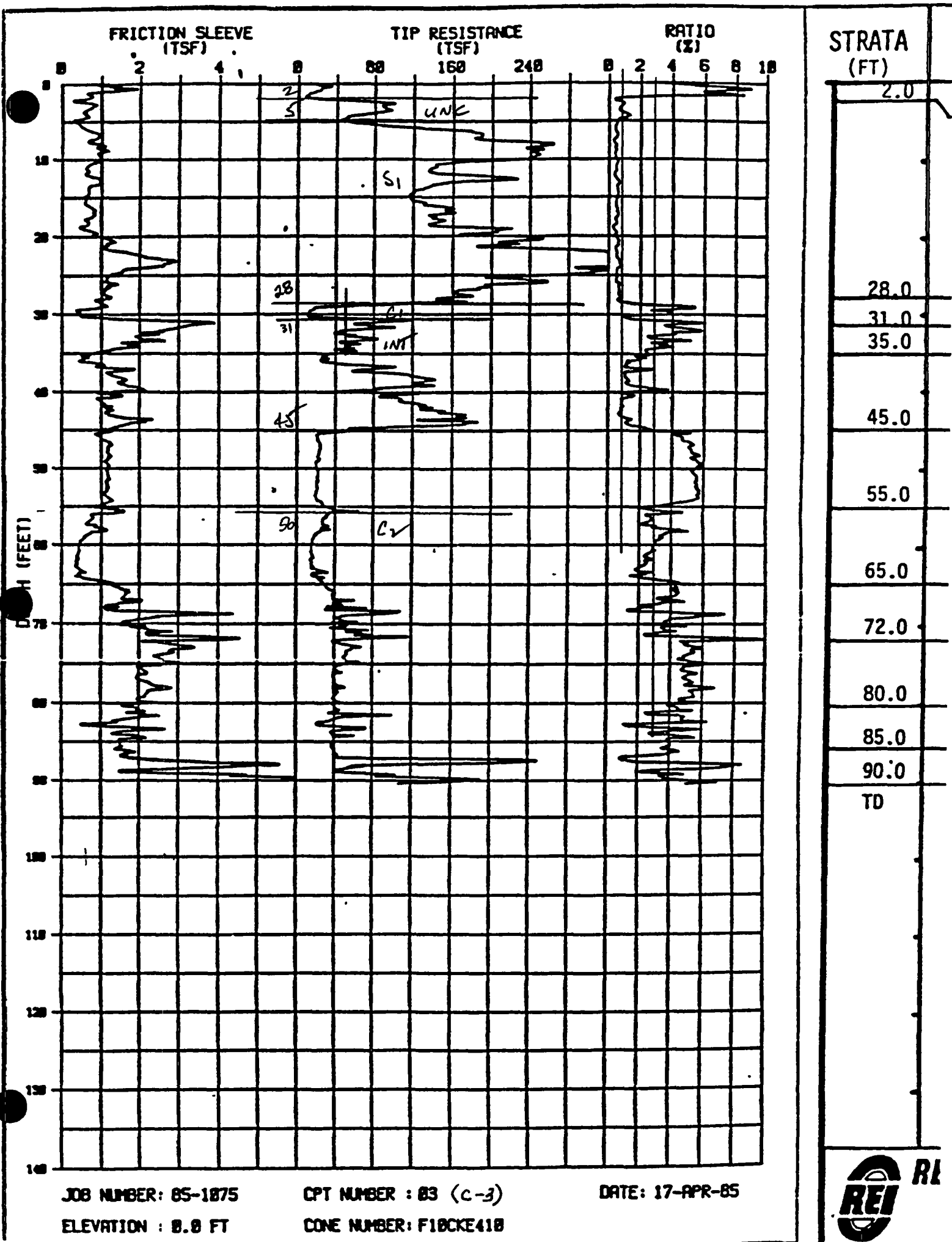
BOTTOM OF WELL — 48

DEPTH
FROM
TOP OF
GROUND
(FEET)

NO SCALE (NOTE DEPTH TO BOTTOM OF BORING IF DIFFERENT THAN BOTTOM OF WELL: —)

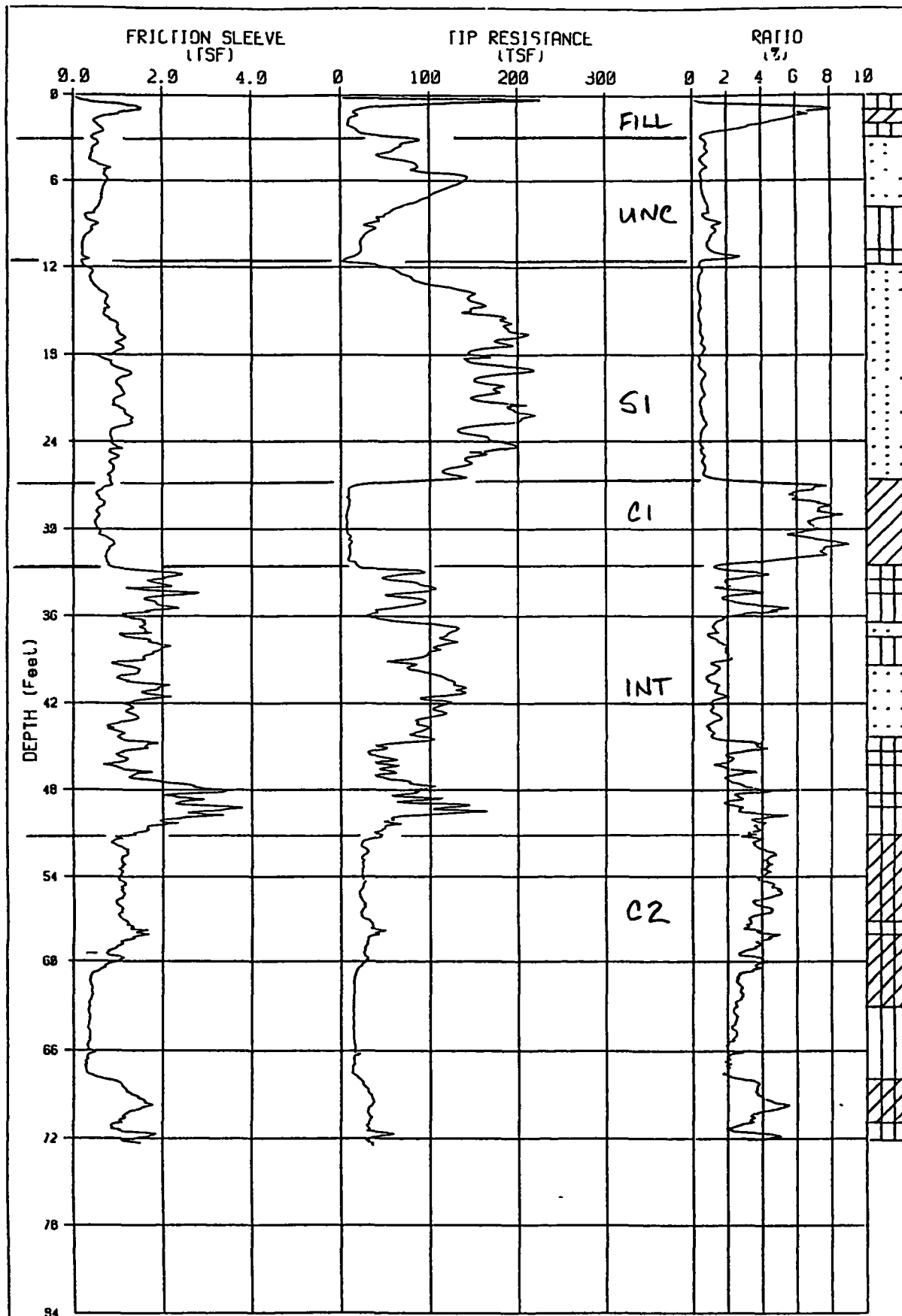
DRILLING AND SAMPLING NOTES:		SAMPLING	
<p>OVM READINGS: 1.8ppm @ 5', <1ppm @ 10', 6ppm @ 15', 1ppm @ 20', 1ppm @ 25', 2ppm @ 30', 7ppm @ 35', 6ppm @ 40', 22ppm @ 45', 4ppm @ 48'.</p> <p>Slight chemical to mud pit @ 27 to 48'.</p>		SAMPLE NO.	INTERVAL (FEET)

072516



072517

0501-2024



CPT NUMBER C4 (CP-4)
CONE NUMBER F5CKE370
ELEVATION 14.8 ft

CONE PENETROMETER SOUNDING
French Lagoon
Crosby, Texas

DATE 06-13-1989 3484.38
LOCATION N3210 06, E3384.38



ENSR CONSULTING & ENGINEERING

SUBSURFACE EXPLORATION

LITHOLOGIC LOG OF DB-17

Client : French Limited Task Group
 Project Name : French Limited Design Phase
 Project Location : Crosby, Texas
 Job Number : 2870-017 Boring No : DB-17
 Logged By : Cameron Teller
 Approved By : Hoyt Clark
 Drilled By : Fugro Geosciences, Inc.

DRILLING AND SAMPLING INFORMATION
 Date Started : 9-18-90 Date Completed : 9-19-90
 Method : Mud Rotary Total Depth : 54 ft
 WELL COMPLETION INFORMATION
 Screen Dia :
 Slot Size :
 Casing Dia :
 Length :
 Type :
 Length :

DEPTH FEET	DESCRIPTION	SAMPLE NO	SAMPLE TYPE	CHEMICAL ANALYSIS	GEOTECH ANALYSIS	GRAPHIC LOG	BORING COMPLETION
	SURFACE ELEVATION : 14.5						
	Fill rock fragments, sand and clay.						
5	Loose brown medium sand, with roots 6-10 ft.	1	ST	✓			
		2	ST	✓			
		3	ST	✓			
		4	ST	✓			
10		5	ST	✓			
		6	ST	✓			
		7	ST	✓			
		8	ST	✓			
25	-little gravel 23-28 ft	9	ST	✓			
		10	ST	✓			
		11	ST	✓			
		12	ST	✓			
30	-some medium and coarse sand 28-29 ft	13	ST	✓			
		14	ST	✓			
		15	ST	✓			
		16	ST	✓			
35	Dense gray clayey coarse sand, some fine gravel	17	ST	✓			
		18	ST	✓			
		19	ST	✓			
		20	ST	✓			
40	Dense gray fine to medium sand						
45	Dense green-gray silt						
50	Interbedded stiff greenish-gray silty clay and loose gray fine sand Moderate to strong odor.						
55	Stiff red-brown clay Blocky texture, slickensided, with silt partings						

GROUT TO SURFACE

SS - DRIVEN SPLIT SPOON
 ST - PRESSED SHELBY TUBE

RC - ROCK CORE
 CT - CONTINUOUS TUBE

HSA - HOLLOW STEM AUGER
 CFA - CONTINUOUS FLIGHT AUGERS

DC - DRIVING CASING
 MD - MUD DRILLING

SAMPLER TYPE

BORING METHOD

072519



Century

DB-17

COMPANY : FUGRO GEOSCIENCES INC.
 WELL : DB-17
 LOCATION/FIELD : FRENCH LTD.
 COUNTY : HARRIS
 STATE : TEXAS
 SECTION :

OTHER SERVICES:

DATE : 09/19/90
 DEPTH DRILLER : 54 J.M.
 LOG BOTTOM : 53 70
 LOG TOP : -4.00

TOWNSHIP : RANGE :

PERMANENT DATUM : GL
 ELEV. PERM. DATUM: GL
 LOG MEASURED FROM: GL
 DRL MEASURED FROM: GL

ELEVATIONS
 KB : GL
 DF : GL
 GL : GL

CASING DRILLER : 00
 CASING TYPE : 00
 CASING THICKNESS: 00

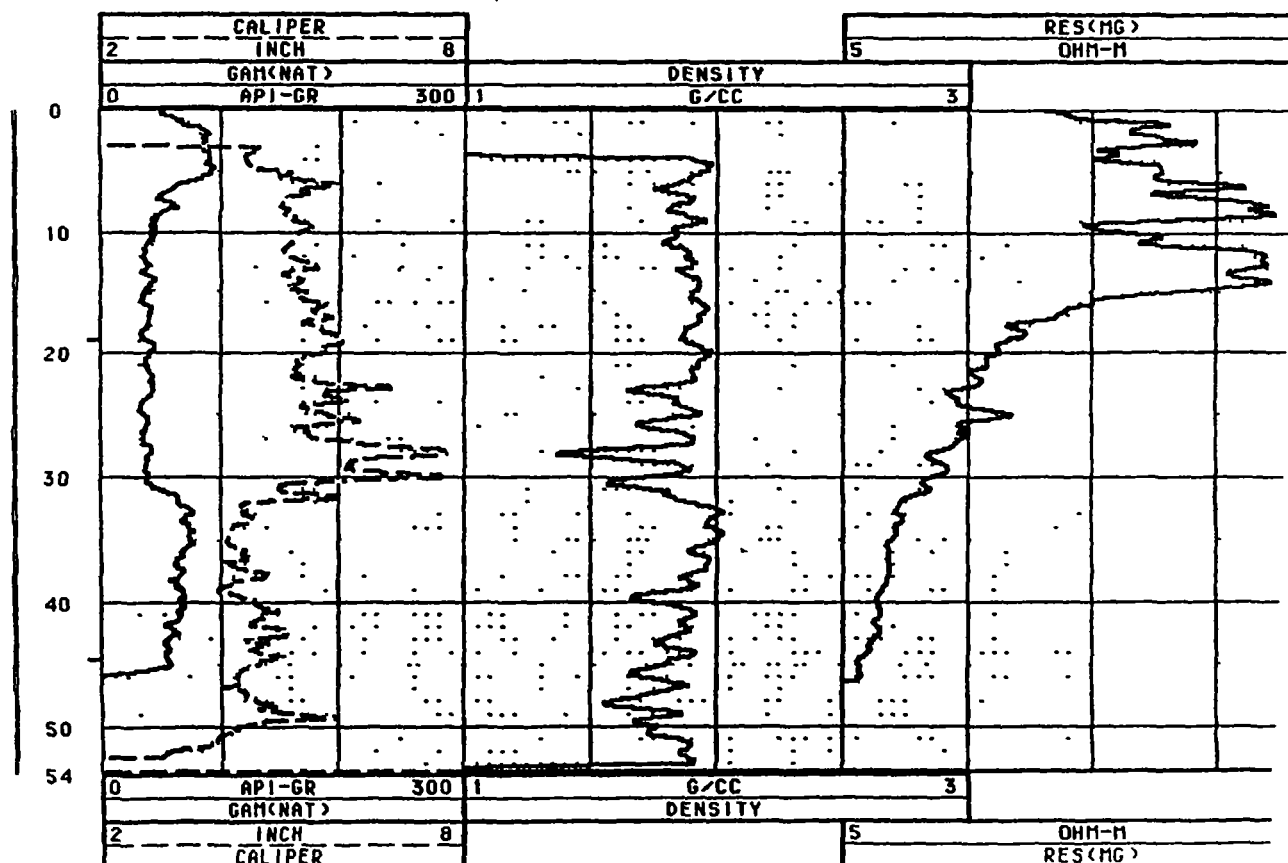
LOGGING UNIT : 9002
 FIELD OFFICE : TULSA,OK.
 RECORDED BY : I.F.ALANIZ

BIT SIZE : 3.874
 MAGNETIC DECL. : 5.8
 MATRIX DENSITY : 271
 FLUID DENSITY : 1.1
 NEUTRON MATRIX : SANDSTONE
 REMARKS :

BOREHOLE FLUID : H2O/GEL
 RM : 0
 RM TEMPERATURE : 0
 MATRIX DELTA T : 57
 FLUID DELTA T : 189

FILE : ORIGINAL
 TYPE : 9030AA
 LOG : 1
 PLOT : COTTER 0
 THRESH: 50000

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS





ENSR CONSULTING & ENGINEERING

SUBSURFACE EXPLORATION

LITHOLOGIC LOG OF DB-18

Client : French Limited Task Group
 Project Name : French Limited Design Phase
 Project Location : Crosby, Texas
 Job Number : 2870-017 Boring No : DB-18
 Logged By : Cameron Teller
 Approved By : Hoyt Clark
 Drilled By : Fugro Geosciences, Inc.

DRILLING AND SAMPLING INFORMATION
 Date Started : 9-17-90 Date Completed : 9-18-90
 Method : Mud Rotary Total Depth : 54 ft
 WELL COMPLETION INFORMATION
 Screen Dia : Length :
 Slot Size : Type :
 Casing Dia : Length :

DEPTH IN FEET	DESCRIPTION	SAMPLE NO	SAMPLE TYPE	CHEMICAL ANALYSIS	GEOTECH ANALYSIS	GRAPHIC LOG	BORING COMPLETION
	SURFACE ELEVATION : (14.5)						
	Fill; clay and sand, with roots.						
5		1	ST	✓			
		2	ST	✓			
8	6.5	3	ST	✓			
10	Loose tan to gray fine sand, little to some silt Slight odor.	4	ST	✓			
	-black 13-14 ft						
15		5	SS	✓			
20	91	6	ST	✓	✓		
	-moderate to strong odor below 23 ft						
25		7	ST	✓			
	-below 28 ft loose gray and white medium to coarse sand						
30	-some fine to coarse gravel 30-32 ft	8	ST	✓	✓		
32	-fine to stiff red-brown clay to silty clay. Silt partings 33-33.5 ft.	9	SS	✓			
33.5	Dense green-gray silt, moderate odor. C1 → 11-19.0	10	ST	✓			
35		11	ST	✓			
		12	ST	✓	✓		
40	-black 40.4-40.6 ft, 41.5-42.5 ft, 43.7-43.9 ft	13	ST	✓			
		14	ST	✓			
45	INT	15	ST	✓			
		16	ST	✓			
		17	ST	✓			
50	-fine sandy below 48 ft	18	ST	✓			
52	-37.5	19	ST	✓			
	Very stiff red-brown clay, blocky texture, slickensided. C2	20	ST	✓	✓		
55							

SAMPLER TYPE

SS - DRIVEN SPLIT SPOON RC - ROCK CORE
 ST - PRESSED SHELBY TUBE CT - CONTINUOUS TUBE

BORING METHOD

HSA - HOLLOW STEM AUGER DC - DRIVING CASING
 CFA - CONTINUOUS FLIGHT AUGERS MD - MUD DRILLING

072521



Century

DB-18

COMPANY : FUGRO GEOSCIENCES INC.
 WELL : DB-18
 LOCATION/FIELD : FRENCH LTD.
 COUNTY : HARRIS
 STATE : TEXAS
 SECTION :

OTHER SERVICES:

TOWNSHIP : RANGE :

DATE : 09/18/90
 DEPTH DRILLER : 54 J.M.
 LOG BOTTOM : 53.50
 LOG TOP : -3.40

PERMANENT DATUM : GL
 ELEV. PERM. DATUM: GL
 LOG MEASURED FROM: GL
 DRL MEASURED FROM: GL

ELEVATIONS
 KB : GL
 DF : GL
 GL : GL

CASING DRILLER : 00
 CASING TYPE : 00
 CASING THICKNESS: 00

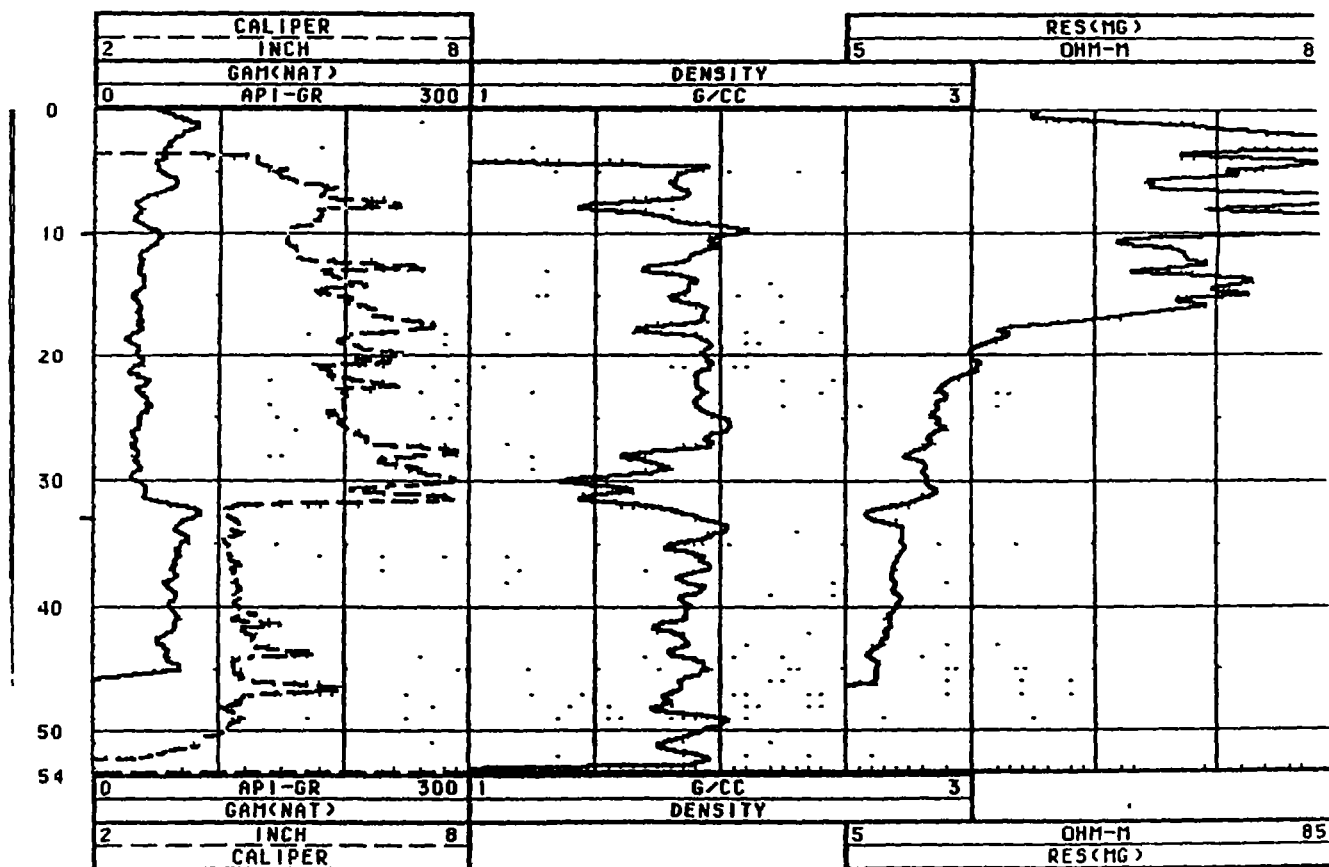
LOGGING UNIT : 9002
 FIELD OFFICE : TULSA,OK.
 RECORDED BY : I.F.ALANIZ

BIT SIZE : 3.874
 MAGNETIC DECL. : 5.8
 MATRIX DENSITY : 271
 FLUID DENSITY : 1.1
 NEUTRON MATRIX : SANDSTONE
 REMARKS :

BOREHOLE FLUID : H2O/GEL
 RM : 0
 RM TEMPERATURE : 0
 MATRIX DELTA T : 57
 FLUID DELTA T : 189

FILE : ORIGINAL
 TYPE : 9030AA
 LOG : 8
 PLOT : COTTER 0
 THRESH: 50000

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS





ENSR CONSULTING & ENGINEERING

Sheet 1 of 1

SUBSURFACE EXPLORATION

LITHOLOGIC LOG OF DB-19

Client - French Limited Task Group
 Project Name : French Limited Design Phase
 Project Location : Crosby, Texas
 Job Number : 2870-017 Boring No : DB-19
 Logged By : Cameron Teller
 Approved By : Hoyt Clark
 Drilled By : Fugro Geosciences, Inc.

DRILLING AND SAMPLING INFORMATION
 Date Started : 9-13-90 Date Completed : 9-14-90
 Method : Mud Rotary Total Depth 60 ft
 WELL COMPLETION INFORMATION
 Screen Dia : Length :
 Slot Size : Type :
 Casing Dia : Length :

DEPTH IN FEET	DESCRIPTION	SAMPLE NO	SAMPLE TYPE	CHEMICAL ANALYSIS	GEOTECH ANALYSIS	GRAPHIC LOG	BORING COMPLETION
	SURFACE ELEVATION : 14.5						
	Fill; stiff dark brown silty clay, some sand, roots.						
5	5	1	ST	✓			
	Loose brown medium sand, little gravel, little silt.	2	ST	✓			
	Soft brown clayey silt.	3	ST	✓			
10	Very stiff dark brown to black sandy clay.	4	ST	✓			
	13						
15	Loose brown fine to medium sand, some silt	5	SS	✓	✓		
20		6	SS	✓			
25		7	SS	✓			
30	28 Firm gray silty clay	8	ST	✓			
		9	ST	✓	✓		
35	34 Dense tan silt.	10	ST	✓			
	-gray below 36 ft, moderate odor	11	ST	✓	✓		
40		12	ST	✓			
	Medium dense gray fine sand and silt.	13	ST	✓			
45		14	ST	✓			
		15	ST	✓			
50		16	ST	✓			
		17	ST	✓			
55		18	ST	✓			
		19	ST	✓			
		20	ST	✓			
		21	ST	✓			
		22	ST	✓			
		23	ST	✓			
	58 Stiff red-brown, yellow, gray silty clay, laminated, horizontal fine sand and silt partings, variable plasticity.						

SS - DRIVEN SPLIT SPOON RC - ROCK CORE
 ST - PRESSED SHELBY TUBE CT - CONTINUOUS TUBE

HSA - HOLLOW STEM AUGER DC - DRIVING CASING
 CFA - CONTINUOUS FLIGHT AUGERS MD - MUD DRILLING

GROUT TO SURFACE

Note: #100 is a duplicate of #16

C2

072523



Century

DB-19

COMPANY : FUGRO GEOSCIENCES INC.
 WELL : DB-19
 LOCATION/FIELD : FRENCH LTD.
 COUNTY : HARRIS
 STATE : TEXAS
 SECTION :

OTHER SERVICES

TOWNSHIP : RANGE :

DATE : 09/14/90
 DEPTH DRILLER : 60 J.M.
 LOG BOTTOM : 59.60
 LOG TOP : -5.00

PERMANENT DATUM : GL
 ELEV. PERM. DATUM : GL
 LOG MEASURED FROM : GL
 DRL MEASURED FROM : GL

ELEVATIONS
 KB : GL
 DF : GL
 GL : GL

CASING DRILLER : 00
 CASING TYPE : 00
 CASING THICKNESS : 00

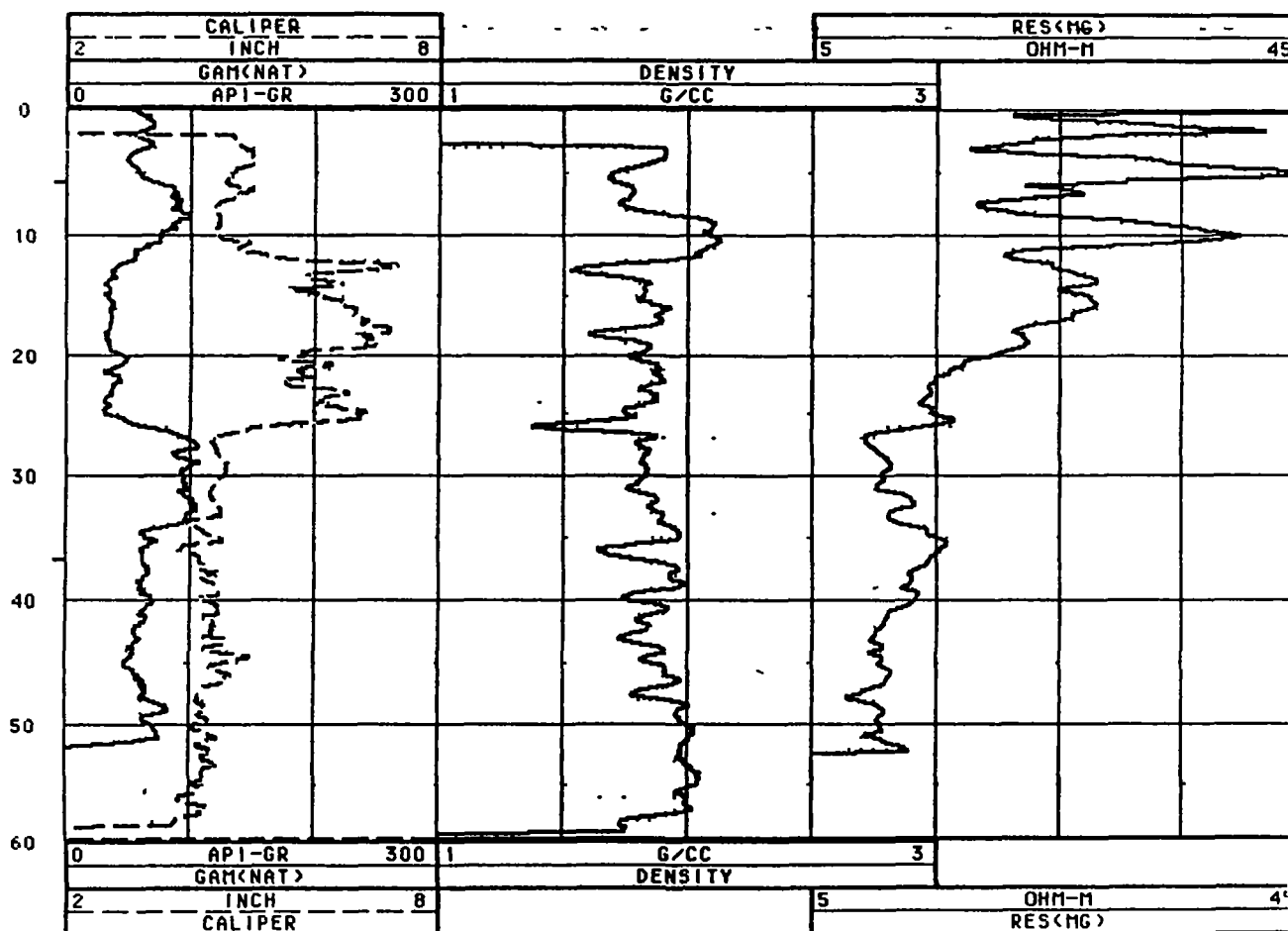
LOGGING UNIT : 9002
 FIELD OFFICE : TULSA.OK.
 RECORDED BY : I.F.ALANIZ

BIT SIZE : 3.874
 MAGNETIC DECL. : 5.8
 MATRIX DENSITY : 271
 FLUID DENSITY : 1.1
 NEUTRON MATRIX : SANDSTONE
 REMARKS :

BOREHOLE FLUID : H2O/GEL
 RM : 0
 RM TEMPERATURE : 0
 MATRIX DELTA T : 57
 FLUID DELTA T : 189

FILE : ORIGINAL
 TYPE : 9030AA
 LOG : 1
 PLOT : COTTER 0
 THRESH: 50000

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



BOOKMARK

Appendix 5

Boring Log and Well Construction Details for REI-6-1

01502437

SUBSURFACE EXPLORATION RECORD

Client FRENCH LIMITED TASK FORCE Boring # REI:6-1
 Architect Engineer C. Itin Job # 27502
 Project Name French Site Drawn By JB
 Project Location Crosby, Texas Approved By JDA

DRILLING and SAMPLING INFORMATION
 Date Started 3-2-84 Hammer Wt. 140 lbs
 Date Completed 3-3-84 Hammer Drop 30 in.
 Drill Foreman G. Little Spoon Sampler OD 2 in.
 Inspector JB Rock Core Dia. - in.
 Boring Method RW/HSA Shelby Tube DD 3 in.

TEST DATA

SOIL CLASSIFICATION		Station Depth	DEPTH SCALE	SAMPLE NO.	SAMPLE TYPE	% RECOVER	GROUND WATER	Standard Penetration Test N, Blows/Ft	Unconfined Strength q _u Pachist Press q _u /Tons/Ft ²	Permeability x 10 ⁻⁸ cm/sec	Natural Dry Hb./cu	Water Content %	LL = Liquid PL = Plastic SL = Shrinkage
SURFACE ELEVATION - 13.0													
SILTY CLAYEY SAND, fine grained, brown to gray, with some thin silty clay seams. (SM-SC) (-)200 = 20% (-)200 = 12.6%		4.5	5	01	SS	39		10					
				02	SS	56		8					
				03	SS	56		4					
SAND, medium to fine grained, gray. (-)200 = 5.2% (-)200 = 2.9%				04	SS	67		3					
				05	SS	56		1					
				06	SS	67		7					
			10	07	SS	56		11					
				08	SS	39		15					
				09	SS	33		18					
(-)200 = 2.9%				10	SS	56		16					
(SP-SW) (-)200 = 2.6%			15	11	SS	61		11					
(-)200 = 1.8%				12	SS	67		8					
(-)200 = 2.8%				13	SS	56		10					
			20	14	SS	61		12					
				15	SS	39		12					
SILTY CLAY, yellow brown to gray mottles (CH-CL)		25.0	25	16	SS	67		13					
				17	SS	56		5					
Continued on page 2													

SAMPLER TYPE
 SS - DRIVEN SPLIT SPOON
 ST - PRESSED SHELBY TUBE
 CA - CONTINUOUS FLIGHT AUGER
 RC - ROCK CORE

GROUND WATER DEPTH
 V AT COMPLETION 5.4 FT
 V AFTER HRS FT
 WATER ON RODS FT.

BORING METHOD
 HSA - HOLLOW STEM AUGERS
 CFA - CONTINUOUS FLIGHT AUGERS
 DC - DRIVING CASING
 MD - MUD DRILLING



SUBSURFACE EXPLORATION RECORD

Client FRENCH LIMITED TASK FORCEBoring # REI:6-1Architect Engineer C. ItinJob # 27502Project Name French SiteDrawn By JBProject Location Crosby, TexasApproved By JDA

DRILLING and SAMPLING INFORMATION

TEST DATA


Date Started 3-2-84 Hammer Wt. 140 lbs.Date Completed 3-3-84 Hammer Drop 30 in.Drill Foreman G. Little Spoon Sampler OD 2 in.Inspector JB Rock Core Dia - in.Boring Method RH Shelby Tube OD 3 in.

SOIL CLASSIFICATION	Stratigraphic Depth	DEPTH SCALE	SAMPLE NO.	SAMPLE TYPE	% RECOVERY	GROUND WATER	Standard Penetration Test N, Blow/ft.	Unclassified Compensated Strength q_u Ton/ft ²	Penetration q_p Ton/ft ²	Permeability k 10 ⁻³ cm/sec	Natural Dry Density lbs/cu ft.	Water Content %	LL = Liquid Limit PL = Plastic Limit SL = Shrinkage Limit
SURFACE ELEVATION -													
SILTY CLAY, yellow brown to gray, mottles, with thin silt & sand seams. (CH-CL) (-)200 = 98.1% (-)200 = 81.3%	29.7	30	18	SS	94		7					36.3%	LL=70 PL=27 PI=57
			19	SS	67		21					35.7%	LL=44 PL=21 PI=28
			20	SS	33		11						
SANDY CLAYEY SILT, very fine grained, olive to gray. (ML) (-)200 = 54% (-)200 = 57% (-)200 = 49%	37.5	35	21	SS	67		27						
			22	SS	67		31						
			23	SS	67		20						
			24	SS	67		23						
			25	SS	89		23						
SILTY CLAYEY SAND, fine grained, very fine grained, olive gray, with thin silty clay seams, & oily streaks and stains. (SC-SM) (-)200 = 53% (-)200 = 41% (-)200 = 60%	46	40	26	SS	78		22						
			27	SS	33		20						
			28	SS	67		27						
			29	SS	67		28						
			30	SS	67		48						
			31	SS	83		37					20.8	LL=26 PL=18 PI=8
VERY SILTY SANDY CLAY/CLAYEY SANDY SILT, red brown to gray with thin silt & sand seams. (CL-ML) (-)200 = 84% (-)200 = 51%	51.0	45	32	SS	89		20						
			33	SS	95		17						LL=23 PL=15 PI=8
Change to Silty Clay		50	34	SS	95		19					16.9	
Continued on page 3													

SAMPLER TYPE
 SS - DRIVEN SPLIT SPOON
 ST - PRESSED SHELBY TUBE
 CA - CONTINUOUS FLIGHT AUGER
 RC - ROCK CORE

GROUND WATER DEPTH
 V AT COMPLETION 5.4 FT.
 V AFTER HRS FT.
 WATER ON RODS FT.

BORING METHOD
 HSA - HOLLOW STEM AUGERS
 CFA - CONTINUOUS FLIGHT AUGERS
 DC - DRIVING CASING
 MD - MUD DRILLING



**RESOURCE
ENGINEERING
INCORPORATED**

SUBSURFACE EXPLORATION RECORD

DRILLING and SAMPLING INFORMATION

TEST DATA

Date Started	3-2-85	Hammer Wt.	140	lbs.
Date Completed	3-3-85	Hammer Drop	30	in.
Drill Foreman	G. Littel	Spoon Sampler OD	2	in.
Inspector	JB	Rock Core Dia.	-	in.
Sealing Method	EW	Shutty Tube OD	30	in.

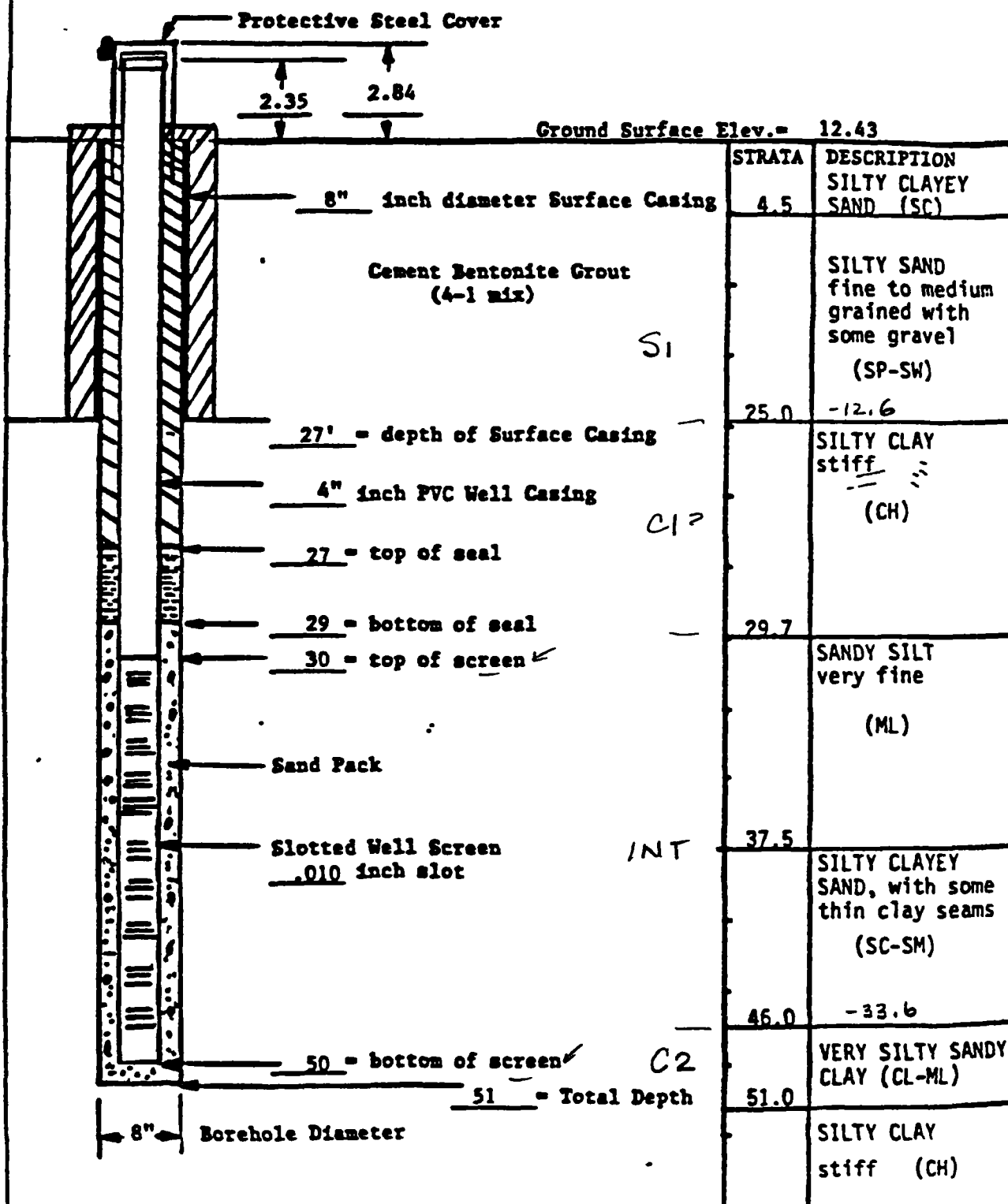
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SAMPLER TYPE
SS - DRIVEN SPLIT SPOON
ST - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

GROUND WATER DEPTH
 ▽ AT COMPLETION 5.4 FT.
 ▽ AFTER HRS FT.
 WATER ON ROOF FT.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

DETAILS OF MONITOR WELL CONSTRUCTION

Project Name: FRENCH LIMITED SITEBoring Number: REI:6-1Project Number: 275-02Date Installed: 3-4-84Water Level Measurement: 6.85Top of Casing Elev.= 14.78Water Level Elev.= 7.93 on 4-10-85

RESOURCE ENGINEERING

BOOKMARK

072529

Appendix 6

**Analytical Reports
INT-11B and INT-11C Soil samples**

01502438

Report
Prepared
for

1024 GULF PUMP ROAD.
CROSBY TX 77532

by

CERTIFIED BY :

Dan Pastalaniec
Project Manager

PROJECT ID :
S.O. NUMBER : SPEC0018

WORK ORDER : H92-04.243
DATE RECEIVED : 22-APR-1992

072531

Analysis Request and Chain Custody Record

No.: 27
Page 1 of

FRENCH LTD. PROJECT FLTG, Incorporated 15010 FM 2100, Suite 200 Crosby, Texas 77532 (713) 328-5860 FAX (713) 328-2996				REPORTING LABORATORY Name: Keystone Lab-Houston Address: 8300 Westpark Houston, TX 77063 Contact: Daniel D. Pastalaniec Phone: (713) 266-6800 FAX: (713) 974-5491			
DATA PACKAGE TO: FLTG, Incorporated Crosby, TX 77532 1024 Gulf Pump Road				Requested By: TD Standard TA: Y Days: 21 Notified by: Date:			
FLTG MATRIX CODE: SPEC FLTG SET NUMBER: SPEC0018 Quality Control Level: I Site Location: 1024 Gulf Pump Road Crosby, TX 77532							
FLTG Sample No	Date	Time	Location	Grab/ Comp	Matrix	Type	
SPEC0018-01	4/21/92	15:30	INT-11B	Grab	Soil	ENV	
SPEC0018-02	4/21/92	16:00	INT-11C	Grab	Soil	ENV	
SAMPLER'S Name(s) (PRINT) 1. <i>Donald A. Flory</i> 2. 3.			Affiliation Drilling Crew				
Carrier:			Bill No.:				
RELINQUISHED BY (SIGN) (INITIALS) Date Time 1. <i>[Signature]</i> 4-22-92 1:25 2.			RECEIVED BY (SIGN) (INITIALS) Date Time <i>Ron Hargrave RH</i> 4-22/92 1:24				
RETURNED BY (SIGN) (INITIALS) Date Time 1. 2.			DISPOSED BY (SIGN) (INITIALS) Date Time				
NOTES TO LAB: Run naphthalene in VOA							

(White - Original Yellow - Set Data Package Pink - FLTG Green - Sampler)

072532

Analysis Request and Chain Custody Record

No.: 277
Page 2 of 2FLTG MATRIX CODE:SPEC
FLTG SET NUMBER:SPEC0018

Lab Work Order No:

SAMPLING SOP REFERENCE:N/A

DESCRIPTION:Soil boring

NOTES TO SAMPLER:

PARAMETERS REQUESTED

GC8015 (TPH)

TOC

TOX

VOA-SX (NAPHT)

FLTG Sample No	Lab Sample ID	Container	Preservative
SPEC0018-01	-----	8 oz WM glass	Refrig
SPEC0018-02	-----	8 oz WM glass	Refrig
COMMENTS		Set QC Completed by: (SIGN) (INITIALS) Date	

(White - Original, Yellow - Set Data Package, Pink - FLTG, Orange - Sampler)

KEYSTONE LAB - HOUSTON
A Division of CHESTER LabNet

Reported on : 8-MAY-1992

Client Name : FRENCH LIMITED	Work Order : H92-04.243
Sample ID : HAT0427-019	Date Collected : 21-APR-1992
Sample Name : H92-04.243-002	Matrix : SOIL
Project No. : SPEC0018	Date Received : 22-APR-1992
Percent Moisture : 19 %	Date Extracted : 23-APR-1992
Client ID : SPEC0018-01 INT-11B	Checked by :

Organic Analysis Data Sheet
Compounds Analysis by SW846 Method 8015

Date Analyzed : 27-APR-1992 20:26 Dilution Factor : 1.000
Analyzed by : 8388624

Cas #	Compound	Detection Limits	Detected Conc. mg/kg
<hr/>			
	TOTAL PETROLEUM HYDROCARBONS	620	97100

U = Undetected at the Listed Detection Limit .
J = Compound is present, but below the Detection Limit.
B = Compound is also found in Blank .

KEYSTONE LAB - HOUSTON
A Division of CHESTER LabNet

Reported on : 8-MAY-1992

Client Name : FRENCH LIMITED	Work Order : H92-04.243
Sample ID : HAT0427-022	Date Collected : 21-APR-1992
Sample Name : H92-04.243-005	Matrix : SOIL
Project No. : SPEC0018	Date Received : 22-APR-1992
Percent Moisture : 19 %	Date Extracted : 23-APR-1992
Client ID : SPEC0018-02 INT-11C	Checked by :

Organic Analysis Data Sheet
Compounds Analysis by SW846 Method 8015

Date Analyzed : 27-APR-1992 22:05 Dilution Factor : 1.000
Analyzed by : 8388624

Cas #	Compound	Detection Limits	Detected Conc. mg/kg
<hr/>			
	TOTAL PETROLEUM HYDROCARBONS	620	69500

U = Undetected at the Listed Detection Limit .

J = Compound is present, but below the Detection Limit.

B = Compound is also found in Blank.

12-JUN-1992

Page

Summary of Analytical Results

Date received: 22-APR-1992 Customer: FLITG ,INC. Job name: H92-04.243

		Samples				
		243-001	243-002	243-003	243-004	243-005
Keystone ID		QA QC	X	QA QC	QA QC	X
Sampling Point		21-APR-1992	21-APR-1992	21-APR-1992	21-APR-1992	21-APR-1992
Date Sampled		LAB BLANK	SPEC0018-01	SPEC0018-01	SPEC0018-01	SPEC0018-02
Customer ID			NA	DUP	MS	NA
Parameters	Units		INT-11 B	(INT-11 B dup analysis)		INT-11 C
Total Organic Carbon (Solid)	mg/Kg	<50.0	38900	39200	105*	31700
Analyst: ELL						
Date/Time: 5/01/92 11:31						
Dilution: 20						
Total Organic Halogens (Solid)	mg/Kg	<10.0	80300	79000	101#	112000
Analyst: RNS						
Date/Time: 5/05/92 08:30						
Dilution: 5000						

* - % Recovery

NR - Not Required

NA - Not Applicable

- Blank Spike Recovery

072536

NST ID: 4000

KEYSTONE DC # ----- 8

SAMPLE NUMBER: SPEC0018-01 INT-

ORGANIC ANALYSIS DATA SHEET -

LABORATORY NAME: KEYSTONE ENV.

AB SAMPLE ID NO.: 910424302

AMPLE MATRIX: SOIL

ATA RELEASE AUTHORIZED BY: *[Signature]*

CASE NO.: -----

INITIAL CALIBRATION DATE:

CONTRACT NO.: --

DATE SAMPLE RECEIVED: 04/22/92

VOLATILES

ONCENTRATION: LOW

ATE ANALYZED: 05/01/92

DATAFILE: 4U04243V02

DILUTION FACTOR: 1.60

COMPOUND		DETECTION <i>5/1/92</i> LIMIT <i>Milli</i> : (MICROGRAMS / KG)	AMOUNT FOUND
C010	CHLOROMETHANE	16 U	
C015	BROMOMETHANE	16 U	
C020	VINYL CHLORIDE	16	8 J
C025	CHLOROETHANE	16	140
C030	METHYLENE CHLORIDE	8	210
C035	ACETONE	16 U	
C040	CARBON DISULFIDE	8	16
C045	1,1-DICHLOROETHENE	8	300
C050	1,1-DICHLOROETHANE	8	970
C053	1,2-DICHLOROETHENE (TOTAL)	8	7200
C060	CHLOROFORM	8	12000
C065	1,2-DICHLOROETHANE	8	13000
C110	2-BUTANONE	16 U	
C115	1,1,1-TRICHLOROETHANE	8 U	
C120	CARBON TETRACHLORIDE	8	7000
C125	VINYL ACETATE	16 U	
C130	BROMODICHLOROMETHANE	8 U	
C140	1,2-DICHLOROPROPANE	8 U	
C143	CIS-1,3-DICHLOROPROPENE	8 U	
C150	TRICHLOROETHENE	8	700
C155	DIBROMOCHLOROMETHANE	8 U	
C160	1,1,2-TRICHLOROETHANE	8	12
C165	BENZENE	8	27
C172	TRANS-1,3-DICHLOROPROPENE	8 U	
C175	2-CHLOROETHYL VINYLETHER	16 U	
C180	BROMOFORM	8 U	
C205	4-METHYL-2-PENTANONE	16	54
C210	2-HEXANONE	16	7 J
C220	TETRACHLOROETHENE	8	3700
C225	1,1,2,2-TETRACHLOROETHANE	8	130
C230	TOLUENE	8	90
C235	CHLOROBENZENE	8 U	
C240	ETHYLBENZENE	8	87
C245	STYRENE	8 U	
C250	XYLENES (TOTAL)	8	250

J = UNDETECTED AT THE LISTED DETECTION LIMIT

J = COMPOUND IS PRESENT, BUT BELOW THE LISTED DETECTION LIMIT

072537

INST ID: 4000

KEYSTONE DC # ----- 8

SAMPLE NUMBER: SPEC001B-01 I

ORGANICS ANALYSIS DATA SHEET - PAGE 4

LABORATORY NAME: KEYSTONE ENVIRONMENTAL RESOURCES, INC.

CASE NO.: ----

GC REPORT NO.:

ANALYST: PVG

DATAFILE: 4U04243V02

B. TENTATIVELY IDENTIFIED COMPOUNDS

CAS #	VOLATILE COMPOUND NAMES	SCAN#	PURITY	AMOUNT
				UG/L
76-01-7	ETHANE, PENTACHLORO-	738	891	690

J = ESTIMATED VALUE - A 1:1 RESPONSE FACTOR IS ASSUMED

072538

INST ID: 4000

KEYSTONE DC # ----- 8
SAMPLE NUMBER: SPEC0018-01 INT-118

ORGANICS ANALYSIS DATA SHEET

LABORATORY NAME: KEYSTONE ENV.

CASE NO.: -----

LAB SAMPLE ID NO.: 910424302

INITIAL CALIBRATION DATE: 04/30/92

SAMPLE MATRIX: WATER

CONTRACT NO.: --

DATA RELEASE AUTHORIZED BY: *RS*

DATE SAMPLE RECEIVED: 04/22/92

RS
VOLATILES

CONCENTRATION: LOW

DATAFILE: 4U04243V02C

DATE ANALYZED: 05/04/92

DILUTION FACTOR: 310.00

COMPOUND	DETECTION LIMIT	AMOUNT FOUND
	MILLI MICROGRAMS / LITER	PER LITER <i>PC</i> 5/4/92
C010 CHLORDMETHANE	3100 U	
C015 BROMOMETHANE	3100 U	
C020 VINYL CHLORIDE	3100 U	
C025 CHLOROETHANE	3100 U	
C030 METHYLENE CHLORIDE	1550 U	
C035 ACETONE	3100 U	
C040 CARBON DISULFIDE	1550 U	
C045 1,1-DICHLOROETHENE	1550 U	
C050 1,1-DICHLOROETHANE	1550	520 J
C053 1,2-DICHLOROETHENE (TOTAL)	1550	5000
C060 CHLOROFORM	1550	27000
C065 1,2-DICHLOROETHANE	1550	21000
C110 2-BUTANONE	3100 U	
C115 1,1,1-TRICHLOROETHANE	1550 U	
C120 CARBON TETRACHLORIDE	1550	26000
C125 VINYL ACETATE	3100 U	
C130 BROMODICHLOROMETHANE	1550 U	
C140 1,2-DICHLOROPROPANE	1550 U	
C143 CIS-1,3-DICHLOROPROPENE	1550 U	
C150 TRICHLOROETHENE	1550	700 J
C155 DIBROMOCHLOROMETHANE	1550 U	
C160 1,1,2-TRICHLOROETHANE	1550 U	
C165 BENZENE	1550 U	
C172 TRANS-1,3-DICHLOROPROPENE	1550 U	
C180 BROMOFORM	1550 U	
C205 4-METHYL-2-PENTANONE	3100 U	
C210 2-HEXANONE	3100 U	
C220 TETRACHLOROETHENE	1550	13000
C225 1,1,2,2-TETRACHLOROETHANE	1550 U	
C230 TOLUENE	1550 U	
C235 CHLORO BENZENE	1550 U	
C240 ETHYL BENZENE	1550 U	
C245 STYRENE	1550 U	
C250 XYLENES (TOTAL)	1550 U	

U = UNDETECTED AT THE LISTED DETECTION LIMIT

J = COMPOUND IS PRESENT, BUT BELOW THE LISTED DETECTION LIMIT

072539

VST ID: 4000

KEYSTONE DC # ----- 8

SAMPLE NUMBER: SPEC0018-01 I

ORGANICS ANALYSIS DATA SHEET - PAGE 4

LABORATORY NAME: KEYSTONE ENVIRONMENTAL RESOURCES, INC.

CASE NO.: -----

C REPORT NO.:

ANALYST: PVG

DATAFILE: 4U04243V020

B. TENTATIVELY IDENTIFIED COMPOUNDS

AS #	VOLATILE COMPOUND NAMES	SCAN#	PURITY	AMOUNT
------	-------------------------	-------	--------	--------

UG/L

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INT. STD.

J = ESTIMATED VALUE - A 1:1 RESPONSE FACTOR IS ASSUMED

072540

INST ID: 4530

SAMPLE NUMBER: SPEC0018-01 INT-11B

ORGANICS ANALYSIS DATA SHEET -

LABORATORY NAME: KEYSTONE
LAB SAMPLE ID NO.: 920424302

SAMPLE MATRIX: SOIL

DATA RELEASE AUTHORIZED BY: *TC*

CASE NO.: --

QC REPORT NO.: 05/18/92

CONTRACT NO.: ---

DATE SAMPLE RECEIVED: *04/22/92*

SEMIVOLATILES

CONCENTRATION: LOW

DATE EXTRACTED *04/23/92*

DATE ANALYZED: 05/27/92

DATAFILE: 4U04243C02

COMPOUND		DETECTION LIMIT (MILLIGRAMS / KG)	AMOUNT FOUND
C315	PHENOL	10000 U	
C325	BIS(2-CHLOROETHYL)ETHER	10000 U	
C330	2-CHLOROPHENOL	10000 U	
C335	1,3-DICHLOROBENZENE	10000 U	
C340	1,4-DICHLOROBENZENE	10000 U	
C345	BENZYL ALCOHOL	10000 U	
C350	1,2-DICHLOROBENZENE	10000 U	
C355	2-METHYLPHENOL	10000 U	
C357	2,2'-OXYBIS(1-CHLOROPROPANE)	10000 U	
C365	4-METHYLPHENOL	10000 U	
C370	N-NITROSODIPROPYLAMINE	10000 U	
C375	HEXACHLOROETHANE	10000	5800 J
C410	NITROBENZENE	10000 U	
C415	ISOPHORONE	10000 U	
C420	2-NITROPHENOL	10000 U	
C425	2,4-DIMETHYLPHENOL	10000 U	
C430	BENZOIC ACID	50000 U	
C435	BIS(2-CHLOROETHOXY)METHANE	10000 U	
C440	2,4-DICHLOROPHENOL	10000 U	
C445	1,2,4-TRICHLOROBENZENE	10000 U	
C450	NAPHTHALENE	10000	1600 J
C455	4-CHLOROANILINE	10000 U	
C460	HEXACHLOROBTADIENE	10000	38000
C465	P-CHLORO-M-CRESOL	10000 U	
C470	2-METHYLNAPHTHALENE	10000	350 J
C510	HEXACHLOROCCYCLOPENTADIENE	10000 U	
C515	2,4,6-TRICHLOROPHENOL	10000 U	
C520	2,4,5-TRICHLOROPHENOL	50000 U	
C525	2-CHLORONAPHTHALENE	10000 U	
C530	2-NITROANILINE	50000 U	
C535	DIMETHYL PHTHALATE	10000 U	
C540	ACENAPHTHYLENE	10000 U	
C545	3-NITROANILINE	50000 U	
C550	ACENAPHTHENE	10000	610 J
C555	2,4-DINITROPHENOL	50000 U	
C560	4-NITROPHENOL	50000 U	
C565	DIBENZOFURAN	10000	360 J
C570	2,4-DINITROTOLUENE	10000 U	
C543	2,6-DINITROTOLUENE	10000 U	

072541

KEYSTONE DC # --- 8

SAMPLE NUMBER: SPEC0018-01 INT-11B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET, CONTINUED

DATAFILE: 4U04243C02

COMPOUND		DETECTION LIMIT (MILLIGRAMS / KG)	AMOUNT FOUND
C580	DIETHYL PHTHALATE	10000 U	
C585	4-CHLOROPHENYL PHENYL ETHER	10000 U	
C590	FLUORENE	10000	600 J
C595	4-NITROANILINE	50000 U	
C610	4,6-DINITRO-2-METHYLPHENOL	50000 U	
C615	N-NITROSODIPHENYLAMINE	10000 U	
C625	4-BROMOPHENYL PHENYL ETHER	10000 U	
C630	HEXACHLOROBENZENE	10000 U	
C635	PENTACHLOROPHENOL	50000 U	
C640	PHENANTHRENE	10000	1000 J
C645	ANTHRACENE	10000 U	
C650	DI-N-BUTYL PHTHALATE	10000 U	
C655	FLUORANTHENE	10000 U	
C715	PYRENE	10000 U	
C720	BUTYL BENZYL PHTHALATE	10000 U	
C725	3,3'-DICHLOROBENZIDINE	20000 U	
C730	BENZO(A)ANTHRACENE	10000 U	
C745	BIS(2-ETHYLHEXYL)PHTHALATE	10000 U	
C740	CHRYSENE	10000 U	
C760	DI-N-OCTYL PHTHALATE	10000 U	
C765	BENZO(B)FLUORANTHENE	10000 U	
C770	BENZO(K)FLUORANTHENE	10000 U	
C775	BENZO(A)PYRENE	10000 U	
C780	INDENO(1,2,3-CD)PYRENE	10000 U	
C785	DIBENZO(A,H)ANTHRACENE	10000 U	
C790	BENZO(GHI)PERYLENE	10000 U	

U = UNDETECTED AT THE LISTED DETECTION LIMIT

J = COMPOUND IS PRESENT, BUT BELOW THE LISTED DETECTION LIMIT

072542

SAMPLE: SPEC0018-01 INT-11B

ORGANICS ANALYSIS DATA SHEET - PAGE 5

LABORATORY NAME KEYSTONE ENV. RESOURCES

CASE NO.: --

QC REPORT NO.: 05/18/92

ANALYST: SC

DATAFILE: 4U04243C0

B. TENTATIVELY IDENTIFIED COMPOUNDS

CAS #	SEMIVOLATILE COMPOUND NAMES	SCAN#	PURITY	AMOUNT
				MG/KG
55880-77-8	1,3-BUTADIENE, PENTACHLORO-	604	900	5900
	ALIPHATIC HYDROCARBON	998		7300

ESTIMATED VALUE - A 1:1 RESPONSE FACTOR IS ASSUMED

072543

INST ID: 4000

KEYSTONE DC # ----- 8

SAMPLE NUMBER: SPEC0018-02 IN

ORGANIC ANALYSIS DATA SHEET -

LABORATORY NAME: KEYSTONE ENV.

LAB SAMPLE ID NO.: 910424305

SAMPLE MATRIX: SOIL

DATA RELEASE AUTHORIZED BY: *Ray*

CASE NO.: ----

INITIAL CALIBRATION DATE:

CONTRACT NO.: --

DATE SAMPLE RECEIVED: 04/22/92

Volatiles
VOLATILES

CONCENTRATION: LOW

DATE ANALYZED: 05/01/92

DATAFILE: 4U04243V05

DILUTION FACTOR: 1.60

COMPOUND		DETECTION LIMIT <i>20 5/1/92</i> (MICROGRAMS / KG)	AMOUNT FOUND
C010	CHLOROMETHANE	16 U	
C015	BROMOMETHANE	16 U	
C020	VINYL CHLORIDE	16 U	
C025	CHLOROETHANE	16	5 J
C030	METHYLENE CHLORIDE	8	49
C035	ACETONE	16 U	
C040	CARBON DISULFIDE	8	3 J
C045	1,1-DICHLOROETHENE	8	50
C050	1,1-DICHLOROETHANE	8	380
C053	1,2-DICHLOROETHENE (TOTAL)	8	2900
C060	CHLOROFORM	8	8700
C065	1,2-DICHLOROETHANE	8	9100
C110	2-BUTANONE	16	18
C115	1,1,1-TRICHLOROETHANE	8	4 J
C120	CARBON TETRACHLORIDE	8	5600
C125	VINYL ACETATE	16 U	
C130	BROMODICHLOROMETHANE	8 U	
C140	1,2-DICHLOROPROPANE	8 U	
C143	CIS-1,3-DICHLOROPROPENE	8 U	
C150	TRICHLOROETHENE	8	480
C155	DIBROMOCHLOROMETHANE	8 U	
C160	1,1,2-TRICHLOROETHANE	8	8 J
C165	BENZENE	8	21
C172	TRANS-1,3-DICHLOROPROPENE	8 U	
C175	2-CHLOROETHYL VINYLETHER	16 U	
C180	BROMOFORM	8 U	
C205	4-METHYL-2-PENTANONE	16	40
C210	2-HEXANONE	16	4 J
C220	TETRACHLOROETHENE	8	3500
C225	1,1,2,2-TETRACHLOROETHANE	8	100
C230	TOLUENE	8	51
C235	CHLOROBENZENE	8 U	
C240	ETHYLBENZENE	8	54
C245	STYRENE	8 U	
C250	XYLENES (TOTAL)	8	170

U = UNDETECTED AT THE LISTED DETECTION LIMIT

J = COMPOUND IS PRESENT, BUT BELOW THE LISTED DETECTION LIMIT

072544

INST ID: 4000

KEYSTONE DC # ----- B

SAMPLE NUMBER: SPEC001B-02 I

ORGANICS ANALYSIS DATA SHEET - PAGE 4

LABORATORY NAME: KEYSTONE ENVIRONMENTAL RESOURCES, INC.

CASE NO.: ----

3C REPORT NO.:

ANALYST: PVG

DATAFILE: 4U04243V05

B. TENTATIVELY IDENTIFIED COMPOUNDS

CAS #	VOLATILE COMPOUND NAMES	SCAN#	PURITY	AMOUNT
				UG/L
76-01-7	ETHANE, PENTACHLORO-	736	894	340

J = ESTIMATED VALUE - A 1:1 RESPONSE FACTOR IS ASSUMED

072545

KEYSTONE DC # ----- 8

INST ID: 4000

SAMPLE NUMBER: SPEC0018-02 INT-11C

ORGANICS ANALYSIS DATA SHEET

LABORATORY NAME: KEYSTONE ENV.

CASE NO.: -----

LAB SAMPLE ID NO.: 910424305

INITIAL CALIBRATION DATE: 04/30/92

SAMPLE MATRIX: WATER

CONTRACT NO.: --

DATA RELEASE AUTHORIZED BY: *RS*

DATE SAMPLE RECEIVED: 04/22/92

RS
VOLATILES

CONCENTRATION: LOW

DATAFILE. 4U04243V05A

DATE ANALYZED: 05/04/92

DILUTION FACTOR: 310.00

COMPOUND	DETECTION LIMIT	AMOUNT K _g FOUND
	MLLS (MICROGRAMS / LITER)	5/4/92
C010 CHLOROMETHANE	3100 U	
C015 BROMOMETHANE	3100 U	
C020 VINYL CHLORIDE	3100 U	
C025 CHLOROETHANE	3100 U	
C030 METHYLENE CHLORIDE	1550 U	
C035 ACETONE	3100	2100 J
C040 CARBON DISULFIDE	1550 U	
C045 1,1-DICHLOROETHENE	1550 U	
C050 1,1-DICHLOROETHANE	1550 U	
C053 1,2-DICHLOROETHENE (TOTAL)	1550 U	
C060 CHLOROFORM	1550	9200
C065 1,2-DICHLOROETHANE	1550	9200
C110 2-BUTANONE	3100 U	
C115 1,1,1-TRICHLOROETHANE	1550 U	
C120 CARBON TETRACHLORIDE	1550	7500
C125 VINYL ACETATE	3100 U	
C130 BROMODICHLOROMETHANE	1550 U	
C140 1,2-DICHLOROPROPANE	1550 U	
C143 CIS-1,3-DICHLOROPROPENE	1550 U	
C150 TRICHLOROETHENE	1550 U	
C155 DIBROMOCHLOROMETHANE	1550 U	
C160 1,1,2-TRICHLOROETHANE	1550 U	
C165 BENZENE	1550 U	
C172 TRANS-1,3-DICHLOROPROPENE	1550 U	
C180 BROMOFORM	1550 U	
C205 4-METHYL-2-PENTANONE	3100 U	
C210 2-HEXANONE	3100 U	
C220 TETRACHLOROETHENE	1550	4500
C225 1,1,2,2-TETRACHLOROETHANE	1550 U	
C230 TOLUENE	1550 U	
C235 CHLOROBENZENE	1550 U	
C240 ETHYLBENZENE	1550 U	
C245 STYRENE	1550 U	
C250 XYLENES (TOTAL)	1550 U	

U = UNDETECTED AT THE LISTED DETECTION LIMIT

I = COMPOUND IS PRESENT, BUT BELOW THE LISTED DETECTION LIMIT

072546

NST ID: 4000

KEYSTONE DC # ----- 8

SAMPLE NUMBER: SPEC0018-02 I

ORGANICS ANALYSIS DATA SHEET - PAGE 4

LABORATORY NAME: KEYSTONE ENVIRONMENTAL RESOURCES, INC.

CASE NO.: -----

REPORT NO.:

ANALYST: PVG

DATAFILE. 4U04243V05A

B. TENTATIVELY IDENTIFIED COMPOUNDS

AS # VOLATILE COMPOUND NAMES SCAN# PURITY AMOUNT

UG/L

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INT. STD.

J = ESTIMATED VALUE - A 1:1 RESPONSE FACTOR IS ASSUMED

INST ID: 4530

SAMPLE NUMBER: SPEC0018-02 INT-11C

ORGANICS ANALYSIS DATA SHEET -

LABORATORY NAME: KEYSTONE
LAB SAMPLE ID NO : 920424305
SAMPLE MATRIX: SOIL

CASE NO. : --

QC REPORT NO. : 05/18/92

DATA RELEASE AUTHORIZED BY: *RO*...

CONTRACT NO. : ---

DATE SAMPLE RECEIVED: *04/22/92*

SEMIVOLATILES

CONCENTRATION. LOW

DATAFILE: 4U04243C05

DATE EXTRACTED: *04/23/92*

DATE ANALYZED: 05/24/92

COMPOUND		DETECTION LIMIT (MILLIGRAMS / KG)	AMOUNT FOUND
C315	PHENOL	10000 U	
C325	BIS(2-CHLOROETHYL)ETHER	10000 U	
C330	2-CHLOROPHENOL	10000 U	
C335	1,3-DICHLOROBENZENE	10000 U	
C340	1,4-DICHLOROBENZENE	10000 U	
C345	BENZYL ALCOHOL	10000 U	
C350	1,2-DICHLOROBENZENE	10000 U	
C355	2-METHYLPHENOL	10000 U	
C357	2,2'-OXYBIS(1-CHLOROPROPANE)	10000 U	
C365	4-METHYLPHENOL	10000 U	
C370	N-NITROSODIPROPYLAMINE	10000 U	
C375	HEXACHLOROETHANE	10000	2200 J
C410	NITROBENZENE	10000 U	
C415	ISOPHORONE	10000 U	
C420	2-NITROPHENOL	10000 U	
C425	2,4-DIMETHYLPHENOL	10000 U	
C430	BENZOIC ACID	50000 U	
C435	BIS(2-CHLOROETHOXY)METHANE	10000 U	
C440	2,4-DICHLOROPHENOL	10000 U	
C445	1,2,4-TRICHLOROBENZENE	10000 U	
C450	NAPHTHALENE	10000	660 J
C455	4-CHLOROANILINE	10000 U	
C460	HEXACHLOROBTADIENE	10000	17000
C465	P-CHLORO-M-CRESOL	10000 U	
C470	2-METHYLNAPHTHALENE	10000 U	
C510	HEXACHLOROCYCLOPENTADIENE	10000 U	
C515	2,4,6-TRICHLOROPHENOL	10000 U	
C520	2,4,5-TRICHLOROPHENOL	50000 U	
C525	2-CHLORONAPHTHALENE	10000 U	
C530	2-NITROANILINE	50000 U	
C535	DIMETHYL PHTHALATE	10000 U	
C540	ACENAPHTHYLENE	10000 U	
C545	3-NITROANILINE	50000 U	
C550	ACENAPHTHENE	10000 U	
C555	2,4-DINITROPHENOL	50000 U	
C560	4-NITROPHENOL	50000 U	
C565	DIBENZOFURAN	10000 U	
C570	2,4-DINITROTOLUENE	10000 U	
C543	2,6-DINITROTOLUENE	10000 U	

SAMPLE NUMBER: SPEC0018-02 INT-11C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET, CONTINUED

DATAFILE: 4U04243C05

COMPOUND	DETECTION LIMIT (MILLIGRAMS / KG)	AMOUNT FOUND
C580 DIETHYL PHTHALATE	10000 U	
C585 4-CHLOROPHENYL PHENYL ETHER	10000 U	
C590 FLUORENE	10000 U	
C595 4-NITROANILINE	50000 U	
C610 4,6-DINITRO-2-METHYLPHENOL	50000 U	
C615 N-NITROSODIPHENYLAMINE	10000 U	
C625 4-BROMOPHENYL PHENYL ETHER	10000 U	
C630 HEXACHLOROBENZENE	10000 U	
C635 PENTACHLOROPHENOL	50000 U	
C640 PHENANTHRENE	10000	410 J
C645 ANTHRACENE	10000 U	
C650 DI-N-BUTYL PHTHALATE	10000 U	
C655 FLUORANTHENE	10000 U	
C715 PYRENE	10000 U	
C720 BUTYL BENZYL PHTHALATE	10000 U	
C725 3,3'-DICHLOROBENZIDINE	20000 U	
C730 BENZO(A)ANTHRACENE	10000 U	
C745 BIS(2-ETHYLHEXYL)PHTHALATE	10000 U	
C740 CHRYSENE	10000 U	
C760 DI-N-OCTYL PHTHALATE	10000 U	
C765 BENZO(B)FLUORANTHENE	10000 U	
C770 BENZO(K)FLUORANTHENE	10000 U	
C775 BENZO(A)PYRENE	10000 U	
C780 INDENO(1,2,3-CD)PYRENE	10000 U	
C785 DIBENZO(A,H)ANTHRACENE	10000 U	
C790 BENZO(GHI)PERYLENE	10000 U	

U = UNDETECTED AT THE LISTED DETECTION LIMIT

J = COMPOUND IS PRESENT, BUT BELOW THE LISTED DETECTION LIMIT

072549

SAMPLE: SPEC0018-02 INT-11C

ORGANICS ANALYSIS DATA SHEET - PAGE 5

LABORATORY NAME: KEYSTONE ENV. RESOURCES

CASE NO . --

QC REPORT NO.: 05/18/92

ANALYST: JZ

DATAFILE. 4U04243C05

B. TENTATIVELY IDENTIFIED COMPOUNDS

CAS # SEMIVOLATILE COMPOUND NAMES SCAN# PURITY AMOUNT

MG/KG

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INT. STD

ESTIMATED VALUE - A 1:1 RESPONSE FACTOR IS ASSUMED